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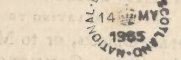
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Dictionary of Arts, Sciences, &c.

OPTICS. PART III.

Of the
Rainbow.SECT. I. *The Application of the foregoing Theory to several natural Phenomena.*§ 1. *Of the Rainbow.*

THIS beautiful phenomenon hath engaged the attention of all ages. By some nations it hath been deified; though the more sensible part always looked upon it as a natural appearance, and endeavoured, however imperfectly, to account for it. The observations of the ancients and philosophers of the middle ages concerning the rainbow were such as could not have escaped the notice of the most illiterate husbandmen who gazed at the sky; and their hypotheses were such as deserve no notice. It was a considerable time even after the dawn of true philosophy in this western part of the world, before we find any discovery of importance on this subject. Maurolycus was the first who pretended to have measured the diameters of the two rainbows with much exactness; and he reports, that he found that of the inner bow to be 45 degrees, and that of the outer bow 56; from which Des Cartes takes occasion to observe, how little we can depend upon the observations of those who were not acquainted with the causes of appearances.

One *Clichtonæus* (the same, it is probable, who distinguished himself by his opposition to Luther, and who died in 1543) had maintained, that the second bow is the image of the first, as he thought was evident from the inverted order of the colours. For, said he, when we look into the water, all the images that we see reflected by it are inverted with respect to the objects themselves; the tops of the trees, for instance, that stand near the brink, appearing lower than the roots.

That the rainbow is opposite to the sun, had always been observed. It was, therefore, natural to imagine, that the colours of it were produced by some kind of reflection of the rays of light from drops of rain, or vapour. The regular order of the colours was another circumstance that could not have escaped the notice of any person. But, notwithstanding mere reflection had in no other case been observed to produce colours, and it could not but have been observed

that refraction is frequently attended with that phenomenon, yet no person seems to have thought of having recourse to a proper refraction in this case, before one *Fletcher* of Breslau, who, in a treatise which he published in 1571, endeavoured to account for the colours of the rainbow by means of a double refraction and one reflection. But he imagined that a ray of light, after entering a drop of rain, and suffering a refraction both at its entrance and exit, was afterwards reflected from another drop, before it reached the eye of the spectator. He seems to have overlooked the reflection at the farther side of the drop, or to have imagined that all the bendings of the light within the drop would not make a sufficient curvature to bring the ray of the sun to the eye of the spectator. That he should think of two refractions, was the necessary consequence of his supposing that the ray entered the drop at all. This supposition, therefore, was all the light that he threw upon the subject. B. Porta supposed that the rainbow is produced by the refraction of light in the whole body of rain or vapour, but not in the separate drops.

After all, it was a man whom no writers allow to have had any pretensions to philosophy, that hit upon this curious discovery. This was Antonio De Dominis, bishop of Spalatro, whose treatise *De Radiis Visus et Lucis*, was published by J. Bartolus in 1611. He first advanced, that the double refraction of Fletcher, with an intervening reflection, was sufficient to produce the colours of the bow, and also to bring the rays that formed them to the eye of the spectator, without any subsequent reflection. He distinctly describes the progress of a ray of light entering the upper part of the drop, where it suffers one refraction, and after being thereby thrown upon the back part of the inner surface, is from thence reflected to the lower part of the drop; at which place undergoing a second refraction, it is thereby bent, so as to come directly to the eye. To verify this hypothesis, this person (no philosopher as he was) proceeded in a very sensible and philosophical manner. For he procured a small globe of solid glass, and viewing it when it was exposed to the rays of the sun, in the same manner in which he had supposed that the drops of rain were situated

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with respect to them, he actually observed the same colours which he had seen in the true rainbow, and in the same order.

Thus the circumstances in which the colours of the rainbow were formed, and the progress of a ray of light through a drop of water, were clearly understood; but philosophers were a long time at a loss when they endeavoured to assign reasons for all the particular colours, and for the order of them. Indeed nothing but the doctrine of the different refrangibility of the rays of light, which was a discovery reserved for the great Sir Isaac Newton, could furnish a complete solution of this difficulty. De Dominis supposed that the red rays were those which had traversed the least space in the inside of a drop of water, and therefore retained more of their native force, and consequently, striking the eye more briskly, gave it a stronger sensation; that the green and blue colours were produced by those rays, the force of which had been, in some measure, obtunded in passing through a greater body of water; and that all the intermediate colours were composed (according to the hypothesis which generally prevailed at that time) of a mixture of these three primary ones. That the different colours were caused by some difference in the impulse of light upon the eye, and the greater or less impression that was thereby made upon it, was an opinion which had been adopted by many persons, who had ventured to depart from the authority of Aristotle.

Afterwards the same De Dominis observed, that all the rays of the same colour must leave the drop of water in a part similarly situated with respect to the eye, in order that each of the colours may appear in a circle, the centre of which is a point of the heavens, in a line drawn from the sun through the eye of the spectator. The red rays, he observed, must issue from the drop nearest to the bottom of it, in order that the circle of red may be the outermost, and therefore the most elevated in the bow.

Notwithstanding De Dominis conceived so justly of the manner in which the inner rainbow is formed, he was far from having as just an idea of the cause of the exterior bow. This he endeavoured to explain in the very same manner in which he had done the interior, viz. by one reflection of the light within the drop, preceded and followed by a refraction; supposing only that the rays which formed the exterior bow, were returned to the eye by a part of the drop lower than that which transmitted the red of the interior bow. He also supposed that the rays which formed one of the bows came from the superior part of the sun's disk, and those which formed the other from the inferior part of it. He did not consider, that upon those principles, the two bows ought to have been contiguous; or rather, that an indefinite number of bows would have had their colours all intermixed; which would have been no bow at all.

When Sir Isaac Newton discovered the different refrangibility of the rays of light, he immediately applied his new theory of light and colours to the phenomena of the rainbow, taking this remarkable object of philosophical inquiry where De Dominis and Descartes, for want of this knowledge, were obliged to leave their investigations imperfect. For they could give no good reason why the bow should be coloured,

and much less could they give any satisfactory account of the order in which the colours appear.

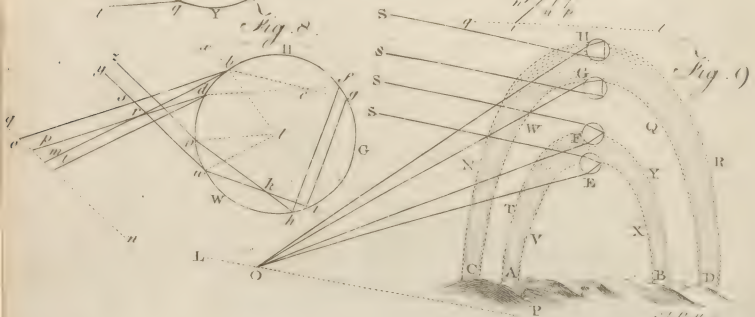
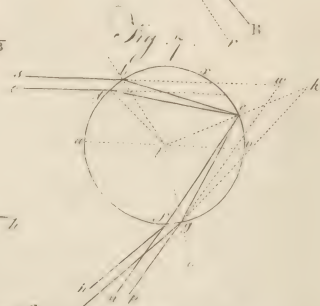
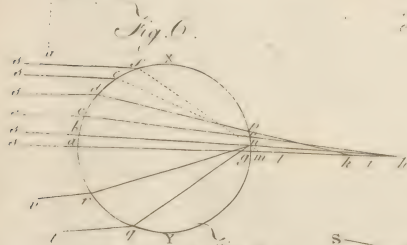
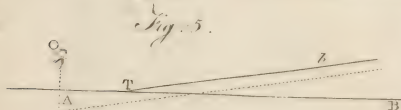
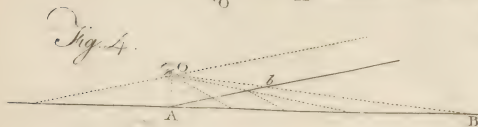
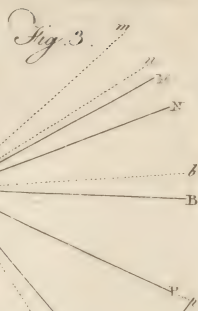
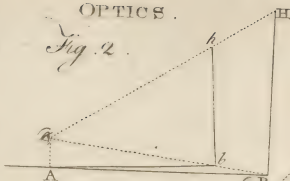
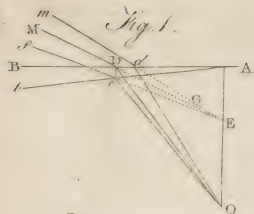
If different particles of light had not different degrees of refrangibility, on which the colours depend, the rainbow, besides being much narrower than it is, would be colourless; but the different refrangibility of differently coloured rays being admitted, the reason is obvious, both why the bow should be coloured, and also why the colours should appear in the order in which they are observed. Let A, (fig. 2.) be a Plate CCXIV.
drop of water, and S a pencil of light; which, on its leaving the drop of water, reaches the eye of the spectator. This ray, at its entrance into the drop, begins to be decomposed into its proper colours; and upon leaving the drop, after one reflection and a second refraction, it is farther decomposed into as many small differently-coloured pencils, as there are primitive colours in the light. Three of them only are drawn in this figure, of which the blue is the most, and the red the least refracted.

The doctrine of the different refrangibility of light enables us to give a reason for the size of a bow of each particular colour. Newton, having found that the sines of refraction of the most refrangible and least refrangible rays, in passing from rain-water into air, are in the proportion of 185 to 182, when the sine of incidence is 138, calculated the size of the bow; and he found, that if the sun was only a physical point, without sensible magnitude, the breadth of the inner bow would be 2 degrees; and if to this 30' was added, for the apparent diameter of the sun, the whole breadth would be 2½ degrees. But as the outermost colours, especially the violet, are extremely faint, the breadth of the bow will not, in reality, appear to exceed two degrees. He finds, by the same principles, that the breadth of the exterior bow, if it was every where equally vivid, would be 4° 20'. But in this case there is a greater deduction to be made, on account of the faintness of the light of the exterior bow; so that, in fact, it will not appear to be more than 3 degrees broad.

The principal phenomena of the rainbow are all explained on Sir Isaac Newton's principles in the following propositions.

When the rays of the sun fall upon a drop of rain and enter into it, some of them, after one reflection and two refractions, may come to the eye of a spectator who has his back towards the sun and his face toward the drop.

If XY (fig. 6.) is a drop of rain, and the sun shines upon it in any lines *sf, sd, sa*, &c. most of the rays will enter into the drop; some few of them only will be reflected from the first surface; those rays, which are reflected from thence, do not come under our present consideration, because they are never refracted at all. The greatest part of the rays then enter the drop, and those passing on to the second surface, will most of them be transmitted through the drop; but neither do those rays which are thus transmitted fall under our present consideration, since they are not reflected. For the rays, which are described in the proposition, are such as are twice refracted and once reflected. However, at the second surface, or hinder part of the drop, at *pg*, some few rays will be



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reflected, whilst the rays are transmitted: those rays proceed in some such lines as nr, nq ; and coming out of the drop in the lines rv, qt , may fall upon the eye of a spectator, who is placed any where in those lines, with his face towards the drop, and consequently with his back towards the sun, which is supposed to shine upon the drop in the lines sf, sd, sa , &c. These rays are twice refracted, and once reflected: they are refracted when they pass out of the air into the drop; they are reflected from the second surface, and are refracted again when they pass out of the drop into the air.

When rays of light reflected from a drop of rain come to the eye, those are called effectual which are able to excite a sensation.

When rays of light come out of a drop of rain, they will not be effectual, unless they are parallel and contiguous.

THERE are but few rays that can come to the eye at all; for the greatest part of those rays which enter the drop XY (fig. 6.) between X and a, pass out of the drop thro' the hinder surface pg ; only few are reflected from thence, and come out through the nearer surface between a and y. Now, such rays as emerge, or come out of the drop, between a and Y, will be ineffectual, unless they are parallel to one another, as rv and qt are; because such rays as come out diverging from one another, will be so far asunder when they come to the eye, that all of them cannot enter the pupil; and the very few that can enter it will not be sufficient to excite any sensation. But even rays, which are parallel, as rv, qt , will not be effectual, unless there are several of them contiguous or very near to one another. The two rays rv and qt alone will not be perceived, though both of them enter the eye; for so very few rays are not sufficient to excite a sensation.

When rays of light come out of a drop of rain after one reflection, those will be effectual which are reflected from the same point, and which entered the drop near to one another.

ANY rays, as sb and cd , (fig. 7.) when they have passed out of the air into a drop of water, will be refracted towards the perpendiculars bh, dl ; and as the ray sb falls farther from the axis av than the ray cd , sb will be more refracted than cd ; so that these rays, though parallel to one another at their incidence, may describe the lines be and de after refraction, and be both of them reflected from one and the same point e . Now all rays which are thus reflected from one and the same point, when they have described the lines ef, eg , and after reflection emerge at f and g , will be so refracted, when they pass out of the drop into the air, as to describe the lines fh, gi , parallel to one another. If these rays were to return from e in the lines eb, ed , and were to emerge at b and d , they would be refracted into the lines of their incidence bs, dc . But if these rays, instead of being returned in the lines eb, ed , are reflected from the same point e in the lines eg, ef , the lines of reflection eg and ef will be inclined both to one another, and to the surface of the drop: just as much as the lines eb and ed are. First eb and eg make just the same angle with the surface of the

drop: for the angle bex , which eb makes with the surface of the drop, is the complement of incidence, and the angle gex , which eg makes with the surface, is the complement of reflection; and these two are equal to one another. In the same manner we might prove, that ed and ef make equal angles with the surface of the drop. Secondly, The angle bed is equal to the angle feg ; or the reflected rays eg, ef , and the incident rays be, de , are equally inclined to each other. For the angle of incidence bel is equal to the angle of reflection gel , and the angle of incidence del is equal to the angle of reflection fel ; consequently the difference between the angles of incidence is equal to the difference between the angles of reflection, or $bel - del = gel - fel$, or $bed = gef$.—Since therefore either the lines eg, ef , or the lines eb, ed , are equally inclined both to one another and to the surface of the drop; the rays will be refracted in the same manner, whether they were to return in the lines eb, ed , or are reflected in the lines eg, ef . But if they were to return in the lines eb, ed , the refraction, when they emerge at b and d , would make them parallel. Therefore, if they are reflected from one and the same point e in the lines eg, ef , the refraction, when they emerge at g and f , will likewise make them parallel.

But though such rays as are reflected from the same point in the hinder part of a drop of rain, are parallel to one another when they emerge, and so have one condition that is requisite towards making them effectual, yet there is another condition necessary; for rays, that are effectual, must be contiguous, as well as parallel. And though rays, which enter the drop in different places, may be parallel when they emerge, those only will be contiguous which enter it nearly at the same place.

Let XY, (fig. 6.) be a drop of rain, ag the axis or diameter of the drop, and sa a ray of light that comes from the sun and enters the drop at the point a . This ray sa , because it is perpendicular to both the surfaces, will pass straight through the drop in the line agh without being refracted; but any collateral rays that fall about sb , as they pass through the drop, will be made to converge to their axis, and passing out at n will meet the axis at b : rays which fall farther from the axis than sb , such as those which fall about sc , will likewise be made to converge; but then their focus will be nearer to the drop than b . Suppose therefore i to be the focus to which the rays that fall about sc will converge, any ray se , when it has described the line eo within the drop, and is tending to the focus i , will pass out of the drop at the point e . The rays that fall upon the drop about sd , more remote still from the axis, will converge to a focus still nearer than i , as suppose at k . These rays therefore go out of the drop at p . The rays, that fall still more remote from the axis, as se , will converge to a focus nearer than k , as suppose at l ; and the ray se , when it has described the line eo within the drop, and is tending to h , will pass out at the point e . The rays, that fall still more remote from the axis, will converge to a focus still nearer. Thus the ray sf will after refraction converge to a focus at m , which is nearer than l ; and having described the line fn within the drop, it will pass out at the point n . Now here we may observe, that

as any rays sb or sc , fall farther above the axis sa , the points n , or o , where they pass out behind the drop, will be farther above g ; or that, as the incident ray rises from the axis sa , the arc gn increases, till we come to some ray sd , which passes out of the drop at p ; and this is the highest point where any ray that falls upon the quadrant or quarter ax can pass out: for any rays se , or sf , that fall higher than sd , will not pass out in any point above p , but at the points o or n , which are below it. Consequently, tho' the arc gn increases, whilst the distance of the incident ray from the axis sa increased, till we come to the ray sd ; yet afterwards, the higher the ray falls above the axis sa , this arc gn will decrease.

We have hitherto spoken of the points on the hinder part of the drop, where the rays pass out of it; but this was for the sake of determining the points from whence those rays are reflected, which do not pass out behind the drop. For, in explaining the rainbow, we have no farther reason to consider those rays which go through the drop; since they can never come to the eye of a spectator placed any where in the lines rv or qt with his face towards the drop. Now, as there are many rays which pass out of the drop between g and p , so some few rays will be reflected from thence; and consequently the several points between g and p , which are the points where some of the rays pass out of the drop, are likewise the points of reflection for the rest which do not pass out. Therefore, in respect of those rays which are reflected, we may call gp the arc of reflection; and many say, that this arc of reflection increases, as the distance of the incident ray from the axis sa increases, till we come to the ray sd ; the arc of reflection is gn for the ray sb , it is go for the ray sc , and gp for the ray sd . But after this, as the distance of the incident ray from the axis sa increases, the arc of reflection decreases; for og less than pg is the arc of reflection for the ray sc , and ng is the arc of reflection for the ray sf .

From hence it is obvious, that some one ray, which falls above sd , may be reflected from the same point with some other ray which falls below sd . Thus, for instance, the ray sb will be reflected from the point n , and the ray sf will be reflected from the same point; and consequently, when the reflected rays nr , nq , are refracted as they pass out of the drop at r and q , they will be parallel, by what has been shewn in the former part of this proposition. But since the intermediate rays, which enter the drop between sf and sb , are not reflected from the same point n , these two rays alone will be the parallel to one another when they come out of the drop, and the intermediate rays will not be parallel to them. And consequently these rays rv , qt , though they are parallel after they emerge at r and q , will not be contiguous, and for that reason will not be effectual; the ray sd is reflected from p , which has been shewn to be the limit of the arc of reflection; such rays as fall just above sd , and just below sd , will be reflected from nearly the same point p , as appears from what has been already shewn. These rays therefore will be parallel, because they are reflected from the same point p : and they will likewise be contiguous, because they all of them enter the drop at one and the same place very near to d . Conse-

quently, such rays as enter the drop at d , and are reflected from p the limit of the arc of reflection, will be effectual; since, when they emerge at the fore part of the drop between a and y , they will be both parallel and contiguous.

If we can make out hereafter that the rainbow is produced by the rays of the sun which are thus reflected from drops of rain as they fall whilst the sun shines upon them, this proposition may serve to shew us, that this appearance is not produced by any rays that fall upon any part, and are reflected from any part of those drops: since this appearance cannot be produced by any rays but those which are effectual; and effectual rays must always enter each drop at one certain place in the fore-part of it, and must likewise be reflected from one certain place in the hinder surface.

When rays that are effectual emerge from a drop of rain after one reflection and two refractions, those which are most refrangible, will, at their emergence, make a less angle with the incident rays than those do which are least refrangible; and by this means the rays of different colours will be separated from one another.

Let fb and gi , (fig. 7.) be effectual violet rays Plate emerging from the drop at fg ; and fn , gp , effectual red rays emerging from the same drop at the same place. Now, though all the violet rays are parallel to one another, because they are supposed effectual, and though all the red rays are likewise parallel to one another for the same reason; yet the violet rays will not be parallel to the red rays. These rays, as they have different colours, and different degrees of refrangibility, will diverge from one another; any violet ray gi , which emerges at g , will diverge from any red ray gp , which emerges at the same place. Now, both the violet ray gi , and the red ray gp , as they pass out of the drop of water into the air, will be refracted from the perpendicular lv . But the violet ray is more refrangible than the red one; and for that reason gi , or the refracted violet ray, will make a greater angle with the perpendicular than gp the refracted red ray; or the angle igo will be greater than the angle pgo . Suppose the incident ray sb to be continued in the direction sk , and the violet ray ig to be continued backward in the direction ik , till it meets the incident ray at k . Suppose likewise the red ray pg to be continued backwards in the same manner, till it meets the incident ray at w . The angle iks is that which the violet ray, or most refrangible ray at its emergence, makes with the incident ray; and the angle pws is that which the red ray, or least refrangible ray at its emergence, makes with the incident ray. The angle iks is less than the angle pws . For, in the triangle, gwk , gws , or pws , is the external angle at the base, and gkw or iks is one of the internal opposite angles; and either internal opposite angle is less than the external angle at the base. (Euc. b. I. prop. 16.) What has been shewn to be true of the rays gi and gp might be shewn in the same manner of the rays fb and fn , or of any other rays that emerge respectively parallel to gi and gp . But all the effectual violet rays are parallel to gi , and all the effectual red rays are parallel to gp . Therefore the effectual violet rays at their emergence make a less angle

angle with the incident ones than the effectual red ones. And for the same reason, in all the other sorts of rays, those which are most refrangible, at their emerſion from a drop of rain after one reflection, will make a leſs angle with the incident rays, than thoſe do which are leſs refrangible.

Or otherwiſe: When the rays gi and gp emerge at the ſame point g , as they both come out of water into air, and conſequently are refracted from a perpendicular, inſtead of going ſtraight forwards in the line eg continued, they will both be turned round upon the point g from the perpendicular go . Now it is eaſy to conceive, that either of theſe lines might be turned in this manner upon the point g as upon a centre, till they become parallel parallel to sb the incident ray. But if either of theſe lines or rays were refracted ſo much from go as to become parallel to sb , the ray ſo much refracted, would, after emerſion, make no angle with sk , becauſe it would be parallel to it. And conſequently that ray which is moſt turned round upon the point g , or that ray which is moſt refrangible, will after emerſion be neareſt parallel to the incident ray, or will make the leaſt angle with it. The ſame may be proved of all other rays emerging parallel to gi and gp reſpectively, or of all effectual rays; thoſe which are moſt refrangible will after emerſion make a leſs angle with the incident rays, than thoſe do which are leaſt refrangible.

But ſince the effectual rays of different colours make different angles with sk at their emerſion, they will be ſeparated from one another: ſo that if the eye was placed in the beam $fghi$, it would receive only rays of one colour from the drop xag ; and if it was placed in the beam $fgnp$, it would receive only rays of ſome other colour.

The angle xwp , which the leaſt refrangible or red rays make with the incident ones when they emerge ſo as to be effectual, is found by calculation to be 42 degrees 2 minutes. And the angle xhi , which the moſt refrangible rays make with the incident ones when they emerge ſo as to be effectual, is found to be 40 degrees 17 minutes. The rays which have the intermediate degrees of refrangibility, make with the incident ones intermediate angles between 42 degrees 2 minutes, and 40 degrees 17 minutes.

If a line is ſuppoſed to be drawn from the centre of the ſun thro' the eye of the ſpectator, the angle which any effectual ray, after two refractions and one reflection, makes with the incident ray, will be equal to the angle which it makes with that line.

LET the eye of the ſpectator be at i , (fig. 7.) and let qt be the line ſuppoſed to be drawn from the centre of the ſun through the eye of the ſpectator; the angle git , which any effectual ray makes with this line, will be equal to the angle kit , which the ſame ray makes with the incident ray sb or sk . If sb is a ray coming from the centre of the ſun, then ſince qt is ſuppoſed to be drawn from the ſame point, theſe two lines, upon account of the remoteneſs of the point from whence they are drawn, may be looked upon as parallel to one another. But the right line ki croſſing theſe two parallel lines will make the alternate angles equal. Euc. b. I. prop. 29. Therefore kit or git is equal to ski .

When the ſun ſhines upon the drops of rain as they are falling; the rays that come from theſe drops to the eye of a ſpectator, after one reflection and two refractions, produce the primary rainbow.

If the ſun ſhines upon the rain as it falls, there are commonly ſeen two bows, as AFB, CHD, (fig. 9.); or if the cloud and rain does not reach over that whole ſide of the ſky where the bows appear, then only a part of one or of both bows is ſeen in that place where the rain falls. Of theſe two bows, the innermoſt AFB is the more vivid of the two, and this is called the primary bow. The outer part TFY of the primary bow is red, the inner part VEX is violet; the intermediate parts, reckoning from the red to the violet, are orange, yellow, green, blue, and indigo. Suppoſe the ſpectator's eye to be at O, and let LOP be an imaginary line drawn from the centre of the ſun through the eye of the ſpectator: if a beam of light S coming from the ſun falls upon any drop F; and the rays that emerge at F in the line FO, ſo as to be effectual, make an angle FOP of $42^{\circ} 2'$ with the line LP; then theſe effectual rays make an angle of $42^{\circ} 2'$ with the incident rays, by the preceding propoſition, and conſequently theſe rays will be red, ſo that the drop F will appear red. All the other rays, which emerge at F, and would be effectual if they fell upon the eye, are refracted more than the red ones, and conſequently will paſs above the eye. If a beam of light S falls upon the drop E; and the rays that emerge at E in the line EO, ſo as to be effectual, make an angle EOP of $40^{\circ} 17'$ with the line LP; then theſe effectual rays make likewiſe an angle of $40^{\circ} 17'$ with the incident rays, and the drop E will appear of a violet colour. All the other rays, which emerge at E, and would be effectual if they came to the eye, are refracted leſs than the violet ones, and therefore paſs below the eye. The intermediate drops between F and E will for the ſame reaſons be of the intermediate colours.

Thus we have ſhewn why a ſet of drops from F to E, as they are falling, ſhould appear of the primary colours, red, orange, yellow, green, blue, indigo, and violet. It is not neceſſary that the ſeveral drops, which produce theſe colours, ſhould all of them fall at exactly the ſame diſtance from the eye. The angle FOP, for inſtance, is the ſame whether the diſtance of the drop from the eye is OF, or whether it is in any other part of the line OF ſomewhat nearer to the eye. And whiſt the angle FOP is the ſame, the angle made by the emerging and incident rays, and conſequently the colour of the drop, will be the ſame. This is equally true of any other drop. So that although in the figure the drops F and E are repreſented as falling perpendicularly one under the other, yet this is not neceſſary in order to produce the bow.

But the coloured line FE, which we have already accounted for, is only the breadth of the bow. It ſtill remains to be ſhewn, why not only the drop F ſhould appear red, but why all the other drops quite from A to B in the arc ATFB ſhould appear of the ſame colour. Now it is evident, that wherever a drop of rain is placed, if the angle which the effectual rays make with the line LP is equal to the angle FOP, that is, if the angle which the effectual rays make with the incident

cident rays is $42^{\circ} 2'$, any of those drops will be red, for the same reason that the drop F is of this colour.

If FOP was to turn round upon the line OP, so that one end of this line should always be at the eye, and the other be at P opposite to the sun; such a motion of this figure would be like that of a pair of compasses turning round upon one of the legs OP with the opening FOP. In this revolution the drop F would describe a circle, P would be the centre, and ATFYB would be an arc in this circle. Now since, in this motion of the line and drop OF, the angle made by FO with OP, that is, the angle FOP, continues the same; if the sun was to shine upon this drop as it revolves, the effectual rays would make the same angle with the incident rays, in whatever part of the arc ATFYB the drop was to be. Therefore, whether the drop is at A, or at T, or at Y, or at B, or wherever else it is in this whole arc, it would appear red, as it does at F. The drops of rain, as they fall, are not indeed turned round in this manner: but then, as innumerable of them are falling at once in right lines from the cloud, whilst one drop is at F, there will be others at Y, at T, at B, at A, and in every other part of the arc ATFYB: and all these drops will be red for the same reason that the drop F would have been red, if it had been in the same place. Therefore, when the sun shines upon the rain as it falls, there will be a red arc ATFYB opposite to the sun. In the same manner, because the drop E is violet, we might prove that any other drop, which, whilst it is falling, is in any part of the arc AVEXB, will be violet; and consequently, at the same time that the red arc ATFYB appears, there will likewise be a violet arc AVEXB below or within it. FE is the distance between these two coloured arcs; and from what has been said, it follows, that the intermediate space between these two arcs will be filled up with arcs of the intermediate colours, orange, yellow, blue, green, and indigo. All these coloured arcs together make up the primary rainbow.

The primary rainbow is never a greater arc than a semicircle.

SINCE the line LOP is drawn from the sun through the eye of the spectator, and since P (fig. 9.) is the centre of the rainbow; it follows, that the centre of the rainbow is always opposite to the sun. The angle FOP is an angle of $42^{\circ} 2'$, as was observed, or F the highest part of the bow is $42^{\circ} 2'$ from P the centre of it. If the sun is more than $42^{\circ} 2'$ high, P the centre of the rainbow, which is opposite to the sun, will be more than $42^{\circ} 2'$ minutes below the horizon; and consequently F the top of the bow, which is only $42^{\circ} 2'$ from P, will be below the horizon; that is, when the sun is more than $42^{\circ} 2'$ minutes high, no primary rainbow will be seen. If the sun is something less than $42^{\circ} 2'$ high, then P will be something less than $42^{\circ} 2'$ below the horizon; and consequently F, which is only $42^{\circ} 2'$ from P, will be just above the horizon; that is, a small part of the bow at this height of the sun will appear close to the ground opposite to the sun. If the sun is 20° high, then P will be 20° below the horizon; and F the top of the bow, being $42^{\circ} 2'$ from P, will be $22^{\circ} 2'$ above the horizon; therefore, at this height of the sun, the bow will be an arc of a circle whose centre is below the horizon; and conse-

quently that arc of the circle which is above the horizon, or the bow, will be less than a semicircle. If the sun is in the horizon, then P, the centre of the bow, will be in the opposite part of the horizon; F, the top of the bow, will be $42^{\circ} 2'$ above the horizon; and the bow itself, because the horizon passes through the centre of it, will be a semicircle. More than a semicircle can never appear; because if the bow was more than a semicircle, P the centre of it must be above the horizon; but P is always opposite to the sun, therefore P cannot be above the horizon, unless the sun is below it; and when the sun is set, or is below the horizon, it cannot shine upon the drops of rain as they fall; and consequently, when the sun is below the horizon, no bow at all can be seen.

When the rays of the sun fall upon a drop of rain, some of them, after two reflections and two refractions, may come to the eye of a spectator, who has his back towards the sun and his face towards the drop.

If HGW (fig. 8.) is a drop of rain, and parallel rays coming from the sun, as zv, yw , fall upon the lower part of it, they will be refracted towards the perpendiculars vl, wl , as they enter into it, and will describe some such lines as vh, wi . At h and i great part of these rays will pass out of the drop; but some of them will be reflected from thence in the lines bf, ig . At f and g again, great part of the rays, that were reflected thither, will pass out of the drop. But these rays will not come to the eye of a spectator at o . However, here again all the rays will not pass out; but some few will be reflected from f and g in some such lines as fd, gb ; and these, when they emerge out of the drop of water into the air at h and d , will be refracted from the perpendiculars, and, describing the lines dt, bo , may come to the eye of the spectator who has his back towards the sun and his face towards the drop.

Those rays, which are parallel to one another after they have been once refracted and once reflected in a drop of rain, will be effectual when they emerge after two refractions and two reflections.

No rays can be effectual, unless they are contiguous, and parallel. From what was said, it appears, that when rays come out of a drop of rain contiguous to one another, either after one or after two reflections, they must enter the drop nearly at one and the same place. And if such rays as are contiguous are parallel after the first reflection, they will emerge parallel, and therefore will be effectual. Let zv and yw be contiguous rays which come from the sun, and are parallel to one another when they fall upon the lower part of the drop, suppose these rays to be refracted at v and w , and to be reflected at h and i ; if they are parallel to one another, as bf, gi , after this first reflection, then, after they are reflected a second time from f and g , and refracted a second time as they emerge at d and b , they will go out of the drop parallel to one another in the lines dt and bo , and will therefore be effectual.

The rays zv, yw , are refracted towards the perpendiculars vl, wl , when they enter the drop, and will be made to converge. As these rays are very oblique, their focus will not be far from the surface vw . If this focus is at k , the rays, after they have passed the focus, will

Rainbow. will diverge from thence in the directions kb , ki ; and if ki is the principal focal distance of the concave reflecting surface hi , the reflected rays bf , ig , will be parallel. These rays ef , ig , are reflected again from the concave surface fg , and will meet in a focus at e , so that ge will be the principal focal distance of this reflecting surface fg . And because hi and fg are parts of the same sphere, the principal focal distances ge and k will be equal to one another. When the rays have passed the focus e , they will diverge from thence in the lines ed , eb ; and we are to shew, that when they emerge at d and b , and are refracted there, they will become parallel.

Now if the rays vk , wk , when they have met at k , were to be turned back again in the directions kv , kw , and were to emerge at v and w , they would be refracted into the lines of their incidence, vz , wy , and therefore would be parallel. But since ge is equal to k , as has already been shewn, the rays ed , eb , that diverge from e , fall in the same manner upon the drop at d and b , as the rays kv , kw , would fall upon it at v and w ; and ed , eb , are just as much inclined to the refracting surface db , as kv , kw , would be to the surface vw . From hence it follows, that the rays ed , eb , emerging at d and b , will be refracted in the same manner, and will have the same direction in respect of one another, as kv , kw , would have. But kv and kw would be parallel after refraction. Therefore ed and eb will emerge in lines dp , bq , so as to be parallel to one another, and consequently so as to be effectual.

When rays that are effectual emerge from a drop of rain after two reflections and two refractions, those which are most refrangible will at their emergence make a greater angle with the incident rays than those do which are least refrangible; and by this means the rays of different colours will be separated from one another.

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CCXIII. If rays of different colours, which are differently refrangible, emerge at any point b , (fig. 8.) these rays will not be all of them equally refracted from the perpendicular. Thus, if bo is a red ray, which is of all others the least refrangible, and bm is a violet ray, which is of all others the most refrangible; when these two rays emerge at b , the violet ray will be refracted more from the perpendicular bx than the red ray, and the refracted angle xom will be greater than the refracted angle xbo . From hence it follows, that these two rays, after emergence, will diverge from one another. In like manner, the rays that emerge at d will diverge from one another; a red ray will emerge in the line dp , a violet ray in the line dq . So that though all the effectual red rays of the beam $bomt$ are parallel to one another, and all the effectual red rays of the beam $bodp$ are likewise parallel to one another, yet the violet rays will not be parallel to the red ones, but the violet beam will diverge from the red beam. Thus the rays of different colours will be separated from one another.

This will appear farther, if we consider what the proposition affirms, That any violet or most refrangible ray will make a greater angle with the incident rays, than any red or least refrangible ray makes with the same incident rays. Thus if yw is an incident ray, bm a violet ray emerging from the point b , and bo a red ray emerging from the same point; the angle which

the violet ray makes with the incident one is yrm , and that which the red ray makes with it is yso . Now yrm is a greater angle than yso . For in the triangle bry the internal angle bry is less than bry the external angle at the base. Euc. B. I. prop. 16. But yrm is the complement of bry or of bry to two right ones, and yso is the complement of bry to two right ones. Therefore, since bry is less than bry , the complement of bry to two right angles will be greater than the complement of bry to two right angles; or yrm will be greater than yso .

Or otherwise: Both the rays bo and bm , when they are refracted in passing out of the drop at b , are turned round upon the point b from the perpendicular bx . Now either of these lines bo or bm might be turned round in this manner, till it made a right angle with yw . Consequently, that ray which is most turned round upon b , or which is most refracted, will make an angle with yw that will be nearer to a right one than that ray makes with it which is least turned round upon b , or which is least refracted. Therefore that ray which is most refracted will make a greater angle with the incident ray than that which is least refracted.

But since the emerging rays, as they are differently refrangible, make different angles with the same incident ray yw , the refraction which they suffer at emergence will separate them from one another.

The angle yrm , which the most refrangible or violet rays make with the incident ones, is found by calculation to be $54^{\circ} 7'$; and the angle yso , which the least refrangible or red rays make with the incident ones, is found to be $50^{\circ} 57'$: the angles, which the rays of the intermediate colours, indigo, blue, green, yellow, and orange, make with the incident rays, are intermediate angles between $54^{\circ} 7'$ and $50^{\circ} 57'$.

If a line is supposed to be drawn from the centre of the sun through the eye of the spectator; the angle, which, after two refractions and two reflections, any effectual ray makes with the incident ray, will be equal to the angle which it makes with that line.

If yw (fig. 8.) is an incident ray, bo an effectual ray, and qn a line drawn from the centre of the sun through o the eye of the spectator; the angle yso , which the effectual ray makes with the incident ray, is equal to son the angle which the same effectual ray makes with the line qn . For yw and qn , considered as drawn from the centre of the sun, are parallel; bo crosses them, and consequently makes the alternate angles yso , son , equal to one another. Euc. B. I. Prop. 29.

When the sun shines upon the drops of rain as they are falling; the rays that come from these drops to the eye of a spectator, after two reflections and two refractions, produce the secondary rainbow.

THE secondary rainbow is the outermost CHD, fig. 9. When the sun shines upon a drop of rain H ; and the rays HO , which emerge at H so as to be effectual, make an angle HOE of $54^{\circ} 7'$ with LOP a line drawn from the sun through the eye of the spectator; the same effectual rays will make likewise an angle of $54^{\circ} 7'$ with the incident rays S , and the rays which emerge at this angle are violet ones, by what was observed above. Therefore, if the spectator's eye

is at O, none but violet rays will enter it: for as all the other rays make a less angle with OP, they will fall above the spectator's eye. In like manner, if the effectual rays that emerge from the drop G make an angle of $50^{\circ} 57'$ with the line OP, they will likewise make the same angle with the incident rays S; and consequently, from the drop G to the spectator's eye at O, no rays will come but red ones; for all the other rays, making a greater angle with the line OP, will fall below the eye at O. For the same reason, the rays emerging from the intermediate drops between H and G, and coming to the spectator's eye at O, will emerge at intermediate angles, and therefore will have the intermediate colours. Thus, if there are seven drops from H to G inclusively, their colours will be violet, indigo, blue, green, yellow, orange, and red. This coloured line is the breadth of the secondary rainbow.

Now, if HOP was to turn round upon the line OP, like a pair of compasses upon one of the legs OP with the opening HOP, it is plain from the supposition, that, in such a revolution of the drop H, the angle HOP would be the same, and consequently the emerging rays would make the same angle with the incident ones. But in such a revolution the drop would describe a circle of which P would be the centre, and CNHRD an arc. Consequently, since, when the drop is at N, or at R, or any where else in that arc, the emerging rays make the same angle with the incident ones as when the drop is at H, the colour of the drop will be the same to an eye placed at O, whether the drop is at N, or at H, or at R, or any where else in that arc. Now, though the drop does not thus turn round as it falls, and does not pass through the several parts of this arc, yet, since there are drops of rain falling every where at the same time, when one drop is at H, there will be another at R, another at N, and others in all parts of the arc; and these drops will all of them be violet-coloured, for the same reason that the drop H would have been of this colour if it had been in any of those places. In like manner, as the drop G is red when it is at G, it would likewise be red in any part of the arc CWGQD; and so will any other drop, when, as it is falling, it comes to any part of that arc. Thus as the sun shines upon the rain, whilst it falls, there will be two arcs produced, a violet coloured one CNHRD, and a red one CWGQD; and for the same reasons the intermediate space between these two arcs will be filled up with arcs of the intermediate colours. All these arcs together make up the secondary rainbow.

The colours of the secondary rainbow are fainter than those of the primary rainbow; and are ranged in the contrary order.

The primary rainbow is produced by such rays as have been only once reflected; the secondary rainbow is produced by such rays as have been twice reflected. But at every reflection some rays pass out of the drop of rain without being reflected; so that the oftener the rays are reflected, the fewer of them are left. Therefore the colours of the secondary bow are produced by fewer rays, and consequently will be fainter, than the colours of the primary bow.

In the primary bow, reckoning from the outside of it, the colours are ranged in this order; red, orange,

yellow, green, blue, indigo, violet. In the secondary bow, reckoning from the outside, the colours are violet, indigo, blue, green, yellow, orange, red. So that the red, which is the outermost or highest colour in the primary bow, is the innermost or lowest colour in the secondary one.

Now the violet rays, when they emerge so as to be effectual after one reflection, make a less angle with the incident rays than the red ones; consequently the violet rays make a less angle with the lines OP (fig. 9.) than the red ones. But, in the primary rainbow, the rays are only once reflected, and the angle which the effectual rays make with OP is the distance of the coloured drop from P the centre of the bow. Therefore the violet drops, or violet arc, in the primary bow, will be nearer to the centre of the bow, than the red drops or red arc; that is, the innermost colour in the primary bow will be violet, and the outermost colour will be red. And, for the same reason, through the whole primary bow, every colour will be nearer to the centre P, as the rays of that colour are more refrangible,

But the violet rays, when they emerge so as to be effectual after two reflections, make a greater angle with the incident rays than the red ones; consequently the violet rays will make a greater angle with the line OP, than the red ones. But in the secondary rainbow the rays are twice reflected, and the angle which effectual rays make with OP is the distance of the coloured drop from P the centre of the bow. Therefore the violet drops or violet arc in the secondary bow will be farther from the centre of the bow than the red drops or red arc; that is, the outermost colour in the secondary bow will be violet, and the innermost colour will be red. And, for the same reason, through the whole secondary bow, every colour will be further from the centre P, as the rays of that colour are more refrangible.

§ 2. Of Coronas, Parhelia, &c.

UNDER the articles CORONA and PARHELION a pretty full account is given of the different hypotheses concerning these phenomena, and likewise of the method by which these hypotheses are supported, from the known laws of refraction and reflection; to which therefore, in order to avoid repetition, we must refer.

§ 3. Of the Apparent Place, Distance, Magnitude, and Motion of Objects.

PHILOSOPHERS in general had taken for granted, that the place to which the eye refers any visible object seen by reflection or refraction, is that in which the visual ray meets a perpendicular from the object upon the reflecting or refracting plane. But this method of judging of the place of objects was called in question by Dr Barrow, who contended that the arguments brought in favour of the opinion were not conclusive. These arguments are, that the images of objects appear straight in a plane mirror, but curved in a convex or concave one: that a straight thread, when partly immersed perpendicularly in water, does not appear crooked as when it is obliquely plunged into the fluid; but that which is within the water seems to be a continuation of that which is without. With respect to the reflected image, however, of a perpendicular right line from a convex, or concave mirror, he

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he says, that it is not easy for the eye to distinguish the curve that it really makes; and that, if the appearance of a perpendicular thread, part of which is plunged in water, be closely attended to, it will not favour the common hypothesis. If the thread is of any shining metal, as silver, and viewed obliquely, the image of the part immersed will appear to detach itself sensibly from that part which is without the water, so that it cannot be true that every object appears to be in the same place where the refracted ray meets the perpendicular; and the same observation he thinks may be extended to the case of reflection. According to this writer, we refer every point of an object to the place from which the pencils of light, that give us the image of it, issue, or from which they would have issued if no reflecting or refracting substance intervened. Pursuing this principle, he proceeds to investigate the place, in which the rays issuing from each of the points of an object, and which reach the eye after one reflection or refraction, meet; and he found, that, if the refracting surface was plane, and the refraction was made from a denser medium into a rarer, those rays would always meet in a place between the eye and a perpendicular to the point of incidence. If a convex mirror be used, the case will be the same; but if the mirror be plane, the rays will meet in the perpendicular, and beyond it if it be concave. He also determined, according to these principles, what form the image of a right line will take, when it is presented in different manners to a spherical mirror, or when it is seen through a refracting medium.

Probable as Dr Barrow thought the maxim which he endeavoured to establish, concerning the supposed place of visible objects, he has the candour to mention an objection to it, and to acknowledge that he was not able to give a satisfactory solution of it. It is this. Let an object be placed beyond the focus of a convex lens; and if the eye be close to the lens, it will appear confused, but very near to its true place. If the eye be a little withdrawn, the confusion will increase, and the object will seem to come nearer; and when the eye is very near the focus, the confusion will be exceedingly great, and the object will seem to be close to the eye. But in this experiment the eye receives no rays but those that are converging; and the point from which they issue is so far from being nearer than the object, that it is beyond it; notwithstanding which, the object is conceived to be much nearer than it is, though no very distinct idea can be formed of its precise distance. It may be observed, that, in reality, the rays falling upon the eye in this case in a manner quite different from that in which they fall upon it in other circumstances, we can form no judgement about the place from which they issue. This subject was afterwards taken up by Berkley, Smith, Montucla, and others.

M. De la Hire made several valuable observations concerning the distance of visible objects, and various other phenomena of vision, which are well worth our notice. He also took particular pains to ascertain the manner in which the eye conforms itself to the view of objects placed at different distances. He enumerates five circumstances, which assist us in judging of the distance of objects, namely, their apparent magnitude,

the strength of the colouring, the direction of the two eyes, the parallax of the objects, and the distinctness of their small parts. Painters, he says, can only take advantage of the two first mentioned circumstances, and therefore pictures can never perfectly deceive the eye; but in the decorations of theatres, they, in some measure, make use of them all. The size of objects, and the strength of their colouring, are diminished in proportion to the distance at which they are intended to appear. Parts of the same object which are to appear at different distances, as columns in an order of architecture, are drawn upon different planes, a little removed from one another, that the two eyes may be obliged to change their direction, in order to distinguish the parts of the nearer plane from those of the more remote. The small distance of the planes serves to make a small parallax, by changing the position of the eye; and as we do not preserve a distinct idea of the quantity of parallax, corresponding to the different distances of objects, it is sufficient that we perceive there is a parallax, to be convinced that these planes are distant from one another, without determining what that distance is; and as to the last circumstance, viz. the distinctness of the small parts of objects, it is of no use in discovering the deception, on account of the false light that is thrown upon these decorations.

To these observations concerning deceptions of sight, we shall add a similar one of M. Le Cat, who took notice that the reason why we imagine objects to be larger when they are seen through a mist, is the dimness or obscurity with which they are then seen; this circumstance being associated with the idea of great distance. This he says is confirmed by our being surprised to find, upon approaching such objects, that they are so much nearer to us, as well as so much smaller, than we had imagined.

Among other cases concerning vision, which fell under the consideration of M. De la Hire, he mentions one which is of difficult solution. It is when a candle, in a dark place, and situated beyond the limits of distinct vision, is viewed through a very narrow chink in a card; in which case a considerable number of candles, sometimes so many as six, will be seen along the chink. This appearance he ascribes to small irregularities in the surface of the humours of the eye, the effect of which is not sensible when rays are admitted into the eye through the whole extent of the pupil, and consequently one principal image effaces a number of small ones; whereas, in this case, each of them is formed separately, and no one of them is so considerable as to prevent the others from being perceived at the same time.

There are few persons, M. De la Hire observes, who have both their eyes perfectly equal, not only with respect to the limits of distinct vision, but also with respect to the colour with which objects appear tinged when they are viewed by them, especially if one of the eyes has been exposed to the impression of a strong light. To compare them together in this respect, he directs us to take two thin cards, and to make in each of them a round hole of a third or a fourth of a line in diameter, and, applying one of them to each of the eyes, to look through the holes on a white paper, equally illuminated; when a circle of the paper will appear to each of the eyes, and, placing

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the cards properly, these two circles may be made to touch one another, and thereby the appearance of the same object to each of the eyes may be compared to the greatest advantage. To make this experiment with the greatest exactness, it is necessary, he says, that the eyes be kept shut some time before the cards be applied to them.

M. De la Hire first endeavoured to explain the cause of those dark spots which seem to float before the eyes, especially those of old people. They are most visible when the eyes are turned towards an uniform white object, as the snow in the open fields. If they be fixed when the eye is so, this philosopher supposed that they were occasioned by extravasated blood upon the retina. But he thought that the movable spots were occasioned by opaque matter floating in the aqueous humour of the eye. He thought the vitreous humour was not sufficiently limpid for this purpose.

By the following calculation M. De la Hire gives us an idea of the extreme sensibility of the optic nerves. One may see very easily, at the distance of 4000 toises, the sail of a wind-mill, 6 feet in diameter; and the eye being supposed to be an inch in diameter, the picture of this sail, at the bottom of the eye, will be $\frac{1}{3570}$ of an inch, which is less than the 666th part of a line, and is about the 66th part of a common hair, or the 8th part of a single thread of silk. So small, therefore, must one of the fibres of the optic nerve be, which he says is almost inconceivable, since each of these fibres is a tube that contains spirits. If birds perceive distant objects as well as men, which he thought very probable, he observes that the fibres of their optic nerves must be much finer than ours.

The person who first took much notice of Dr Barrow's hypothesis was the ingenious Dr Berkeley, bishop of Cloyne, who distinguished himself so much by the objections which he started to the reality of a material world, and by his opposition to the Newtonian doctrine of fluxions. In his essay on a new theory of vision, he observes, that the circle formed upon the retina, by the rays which do not come to a focus, produce the same confusion in the eye, whether they cross one another before they reach the retina, or tend to do it afterwards; and therefore that the judgment concerning distance will be the same in both the cases, without any regard to the place from which the rays originally issued; so that in this case, as, by receding from the lens, the confusion, which always accompanies the nearness of an object, increases, the mind will judge that the object comes nearer.

But, says Dr Smith, if this be true, the object ought always to appear at a less distance from the eye than that at which objects are seen distinctly, which is not the case: and to explain this appearance, as well as every other in which a judgment is formed concerning distance, he maintains, that we judge of it by the apparent magnitude of objects only, or chiefly; so that, since the image grows larger as we recede from the lens through which it is viewed, we conceive the object to come nearer. He also endeavours to shew, that, in all cases in which glasses are used, we judge of distance by the same simple rule; from which he concludes universally, that the apparent distance of an object seen in a glass, is to its apparent distance seen by the naked eye, as the apparent magnitude to

the naked eye is to its apparent magnitude in the glass.

But that we do not judge of distance merely by the angle under which objects are seen, is an observation as old as Alhazen, who mentions several instances, in which, though the angles under which objects appear be different, the magnitudes are universally and instantaneously deemed not to be so. And Mr Robins clearly shews the hypothesis of Dr Smith to be contrary to fact in the most common and simple cases. In microscopes, he says, it is impossible that the eye should judge the object to be nearer than the distance at which it has viewed the object itself, in proportion to the degree of magnifying. For when the microscope magnifies much, this rule would place the image at a distance, of which the sight cannot possibly form any opinion, as being an interval from the eye at which no object can be seen. In general, he says, he believes, that whoever looks at an object through a convex glass, and then at the object itself, without the glass, will find it to appear nearer in the latter case, though it be magnified in the glass; and in the same trial with the concave glass, though by the glass the object be diminished, it will appear nearer through the glass than without it.

But the most convincing proof that the apparent distance of the image is not determined by its apparent magnitude is the following experiment. If a double convex glass be held upright before some luminous object, as a candle, there will be seen two images, one erect, and the other inverted. The first is made simply by reflection from the nearest surface, the second by reflection from the farther surface, the rays undergoing a refraction from the first surface both before and after the reflection. If this glass has not too short a focal distance, when it is held near the object, the inverted image will appear larger than the other, and also nearer; but if the glass be carried off from the object, though the eye remain as near to it as before, the inverted image will diminish so much faster than the other, that, at length, it will appear very much less than it, but still nearer. Here, says Mr Robins, two images of the same object are seen under one view, and their apparent distances immediately compared; and here it is evident, that those distances have no necessary connection with the apparent magnitude. He also shews how this experiment may be made still more convincing, by sticking a piece of paper on the middle of the lens, and viewing it thro' a short tube.

M. Bouguer adopts the general maxim of Dr Barrow, in supposing that we refer objects to the place from which the pencils of rays seemingly converge at their entrance into the pupil. But when rays issue from below the surface of a vessel of water, or any other refracting medium, he finds that there are always two different places of this seeming convergence; one of them of the rays that issue from it in the same vertical circle, and therefore fall with different degrees of obliquity upon the surface of the refracting medium; and another, of those that fall upon the surface with the same degree of obliquity, entering the eye laterally with respect to one another. Sometimes, he says, one of these images is attended to by the mind, and sometimes the other, and different images may be observed by different persons. An object plunged in

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water affords an example, he says, of this duplicity of images.

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If BA, fig. 1. be part of the surface of water, and the object be at O, there will be two images of it, in two different places; one at G, on the caustic by refraction, and the other at E, in the perpendicular AO, which is as much a caustic as the other line. The former image is visible by the rays ODM, Odm, which are one higher than the other, in their progress to the eye; whereas the image at E is made by the rays ODM, Odf, which enter the eye laterally. This, says he, may serve to explain the difficulty of Father Tacquet, Barrow, Smith, and many other authors, and which Newton himself considered as a very difficult problem, though it might not be absolutely infoluble.

G. W. Krafft has ably supported the opinion of Dr Barrow, that the place of any point, seen by reflection from the surface of any medium, is that in which rays issuing from it, infinitely near to one another, would meet; and considering the case of a distant object, viewed in a concave mirror, by an eye very near to it, when the image, according to Euclid and other writers, would be between the eye and the object, and the rule of Dr Barrow cannot be applied, he says that in this case the speculum may be considered as a plane, the effect being the same, only the image is more obscure.

Dr Porterfield gives a distinct and comprehensive view of the natural methods of judging concerning the distance of objects.

The conformation of the eye, he observes, can be of no use to us with respect to objects that are placed without the limits of distinct vision. As the object, however, does then appear more or less confused, according as it is more or less removed from those limits, this confusion assists the mind in judging of the distance of the object; it being always esteemed so much the nearer, or the farther off, by how much the confusion is greater. But this confusion hath its limits also, beyond which it can never extend; for when an object is placed at a certain distance from the eye, to which the breadth of the pupil bears no sensible proportion, the rays of light that come from a point in the object, and pass the pupil, are so little diverging, that they may be considered as parallel. For a picture on the retina will not be sensibly more confused, tho' the object be removed to a much greater distance.

The most universal, and frequently the most sure means of judging of the distance of objects is, he says, the angle made by the optic axis. For our two eyes are like two different stations, by the assistance of which distances are taken; and this is the reason why those persons who are blind of one eye, so frequently miss their mark in pouring liquor into a glass, snuffing a candle, and such other actions as require that the distance be exactly distinguished. To convince ourselves of the usefulness of this method of judging of the distance of objects, he directs us to suspend a ring in a thread, so that its side may be towards us, and the hole in it to the right and left hand; and taking a small rod, crooked at the end, retire from the ring two or three paces, and having with one hand covered one of our eyes, to endeavour with the other to

pass the crooked end of the rod thro' the ring. This, says he, appears very easy; and yet, upon trial, perhaps once in 100 times we shall not succeed, especially if we move the rod a little quickly.

Our author observes, that by persons recollecting the time when they began to be subject to the mistakes above-mentioned, they may tell when it was that they lost the use of one of their eyes; which many persons are long ignorant of, and which may be a circumstance of some consequence to a physician †. The use of this second method of judging of distances De Chales limited to 120 feet; beyond which, he says, we are not sensible of any difference in the angle of the optic axis.

A third method of judging of the distance of objects, consists in their apparent magnitudes, on which so much stress was laid by Dr Smith. From this change in the magnitude of the image upon the retina, we easily judge of the distance of objects, as often as we are otherwise acquainted with the magnitude of the objects themselves; but as often as we are ignorant of the real magnitude of bodies, we can never, from their apparent magnitude, form any judgment of their distance.

From this we may see why we are so frequently deceived in our estimates of distance, by any extraordinary magnitudes of objects seen at the end of it; as, in travelling towards a large city, or a castle, or a cathedral church, or a mountain larger than ordinary, we fancy them to be nearer than we find them to be. This also is the reason why animals, and all small objects, seen in valleys, contiguous to large mountains, appear exceedingly small. For we think the mountain nearer to us than if it were smaller; and we should not be surpris'd at the smallness of the neighbouring animals, if we thought them farther off. For the same reason, we think them exceedingly small when they are placed upon the top of a mountain, or a large building; which appear nearer to us than they really are, on account of their extraordinary size.

Dr Jurin clearly accounts for our imagining objects, when seen from a high building, to be smaller than they are, and smaller than we fancy them to be when we view them at the same distance on level ground. It is, says he, because we have no distinct idea of distance in that direction, and therefore judge of things by their pictures upon the eye only; but custom will enable us to judge rightly even in this case.

Lct a boy, says he, who has never been upon any high building, go to the top of the monument, and look down into the street; the objects seen there, as men and horses, will appear so small as greatly to surprise him. But 10 or 20 years after, if in the mean time he has used himself now and then to look down from that and other great heights, he will no longer find the same objects to appear so small. And if he was to view the same objects from such heights as frequently as he sees them upon the same level with himself in the streets, he supposes that they would appear to him just of the same magnitude from the top of the monument, as they do from a window one story high. For this reason it is, that statues placed upon very high buildings ought to be made of a larger size than those which are seen at a nearer distance,

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† See
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stance; because all persons, except architects, are apt to imagine the height of such buildings to be, much less than it really is.

The fourth method by which Dr Porterfield says that we judge of the distance of objects, is, the force with which their colour strikes upon our eyes. For if we be assured that two objects are of a similar and like colour, and that one appears more bright and lively than the other, we judge that the brighter object is the nearer of the two.

The fifth method consists in the different appearance of the small parts of objects. When these parts appear distinct, we judge that the object is near; but when they appear confused, or when they do not appear at all, we judge that it is at a greater distance. For the image of any object, or part of an object, diminishes as the distance of it increases.

The sixth and last method by which we judge of the distance of objects is, that the eye does not represent to our mind one object alone, but at the same time all those that are placed betwixt us and the principal object, whose distance we are considering; and the more this distance is divided into separate and distinct parts, the greater it appears to be. For this reason, distances upon uneven surfaces appear less than upon a plane; for the inequalities of the surfaces, such as hills, and holes, and rivers, that lie low and out of sight, either do not appear, or hinder the parts that lie behind them from appearing; and so the whole apparent distance is diminished by the parts that do not appear in it. This is the reason that the banks of a river appear contiguous to a distant eye, when the river is low and not veen.

Dr Porterfield very well explains several fallacies in vision depending upon our mistaking the distances of objects. Of this kind, he says, is the appearance of parallel lines, and long vistas consisting of parallel rows of trees; for they seem to converge more and more, as they are farther extended from the eye. The reason of this, he says, is because the apparent magnitudes of their perpendicular intervals are perpetually diminishing, while, at the same time, we mistake their distance. Hence we may see why, when the two parallel rows of trees stand upon an ascent, whereby the more remote parts appear farther off than they really are, because the line that measures the length of the vistas now appears under a greater angle than when it was horizontal, the trees, in such a case, will seem to converge less, and sometimes, instead of converging, they will be thought to diverge.

For the same reason that a long vista appears to converge more and more the farther it is extended from the eye, the remoter parts of a horizontal walk or a long floor will appear to ascend gradually; and objects placed upon it, the more remote they are, the higher they will appear, till the last be seen on a level with the eye; whereas the ceiling of a long gallery appears to descend towards a horizontal line, drawn from the eye of the spectator. For this reason, also, the surface of the sea, seen from an eminence, seems to rise higher and higher the farther we look; and the upper parts of high buildings seem to stoop, or incline forwards over the eye below, because they seem to approach towards a vertical line proceeding from the spectator's eye; so that statues on the top of such

buildings, in order to appear upright, must recline, or bend backwards.

Our author also shews the reason why a windmill, seen from a great distance, is sometimes imagined to move the contrary way from what it really does, by our taking the nearer end of the sail for the more remote. The uncertainty we sometimes find in the course of the motion of a branch of lighted candles, turned round at a distance, is owing, he says, to the same cause; as also our sometimes mistaking a convex for a concave surface, more especially in viewing seals, and impressions, with a convex glass or a double microscope; and lastly, that, upon coming in a dark night into a street, in which there is but one row of lamps, we often mistake the side of the street they are on.

Far more light was thrown upon this curious subject by M. Bouguer.

The proper method of drawing the appearance of two rows of trees that shall appear parallel to the eye, is a problem which has exercised the ingenuity of several philosophers and mathematicians. That the apparent magnitude of objects decreases with the angle under which they are seen, has always been acknowledged. It is also acknowledged, that it is only by custom and experience that we learn to form a judgment both of magnitudes and distances. But in the application of these maxims to the above-mentioned problem, all persons, before M. Bouguer, made use of the real distance instead of the apparent one; by which only the mind can form its judgment. And it is manifest, that, if any circumstances contribute to make the distance appear otherwise than it is in reality, the apparent magnitude of the object will be affected by it; for the same reason, that, if the magnitude be misapprehended, the idea of the distance will vary.

For want of attending to this distinction, Taquet pretended to demonstrate, that nothing can give the idea of two parallel lines (rows of trees for instance) to an eye situated at one of their extremities, but two hyperbolic curves, turned the contrary way; and M. Varignon maintained, that in order to make a vista appear of the same width, it must be made narrower, instead of wider, as it recedes from the eye.

M. Bouguer observes, that very great distances, and those that are considerably less than them, make nearly the same impression upon the eye. We, therefore, always imagine great distances to be less than they are, and for this reason the ground-plan of a long vista always appears to rise. The visual rays come in a determinate direction; but as we imagine that they terminate sooner than they do, we necessarily conceive that the place from which they issue is elevated. Every large plane, therefore, as AB, fig. 4. viewed by an eye at O, will seem to lie in such a direction as A*b*; and consequently lines, in order to appear truly parallel on the plane AB, must be drawn so as that they would appear parallel on the plane A*b*, and be from thence projected to the plane AB.

To determine the inclination of the apparent ground-plane A*b* to the true ground-plane AB, our ingenious author directs us to draw upon a piece of level ground, two straight lines of a sufficient length, (for which purpose lines fastened to small sticks are very

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convenient), making an angle of 3 or 4 degrees with one another. Then a person, placing himself within the angle, with his back towards the angular point, must walk backwards and forwards till he can fancy the lines to be parallel. In this situation, a line drawn from the point of the angle thro' the place of his eye, will contain the same angle with the true ground-plane which this does with the apparent one.

M. Bouguer then shews other more geometrical methods of determining this inclination; and says, that by these means he has often found it to be 4 or 5 degrees, though sometimes only 2 or 2½ degrees. The determination of this angle, he observes, is variable; depending upon the manner in which the ground is illuminated, and the intensity of the light. The colour of the soil is also not without its influence, as well as the particular conformation of the eye, by which it is more or less affected by the same degree of light, and also the part of the eye on which the object is painted. When, by a slight motion of his head, he contrived, that certain parts of the soil, the image of which fell towards the bottom of his eye, should fall towards the top of the retina, he always thought that this apparent inclination became a little greater.

But what is very remarkable, and what he says he can assure his reader may be depended upon, is, that, if he look towards a rising ground, the difference between the apparent ground-plan and the true one, will be much more considerable, so that they will sometimes make an angle of 25 or 30 degrees. Of this he had made frequent observations. Mountains, he says, begin to be inaccessible when their sides made an angle from 35 to 37 degrees with the horizon, as then it is not possible to climb them but by means of stones or shrubs, to serve as steps to fix the feet on. In these cases, both he and his companions always agreed that the apparent inclination of the side of the mountain was 60 or 70 degrees.

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These deceptions are represented in fig. 3. in which, when the ground plan, AM, or AN, are much inclined, the apparent ground plan A_m , or A_n , makes a very large angle with it. On the contrary, if the ground dips below the level, the inclination of the apparent to the true ground-plan diminishes, till, at a certain degree of the slope, it becomes nothing at all; the two plans AP and A p being the same, so that parallel lines drawn upon them would always appear so. If the inclination below the horizon is carried beyond the situation AP, the error will increase; and what is very remarkable, it will be on the contrary side; the apparent plan A r being always below the true plan AR, so that if a person would draw upon the plan AR lines that shall appear parallel to the eye, they must be drawn converging, and not diverging, as is usual on the level ground, because they must be the projections of two lines imagined to be parallel, on the plan A r , which is more inclined to the horizon than AR.

These remarks, he observes, are applicable to different planes exposed to the eye at the same time. For if BH, fig. 2. be the front of a building, at the distance of AB from the eye, it will be reduced in appearance to the distance Ab; and the front of the building will be bb, rather inclined towards the spectator, unless the distance be inconsiderable.

After making a great number of observations upon

this subject, our author concludes, that when a man stands upon a level plane, it does not seem to rise sensibly but at some distance from him. The apparent plane, therefore, has a curvature in it, at that distance, the form of which is not very easy to determine; so that a man standing upon a level plane, of infinite extent, will imagine that he stands in the centre of a basin. This is also, in some measure, the case with a person standing upon the level of the sea.

He concludes with observing that there is no difficulty in drawing lines according to these rules, so as to have any given effect upon the eye, except when some parts of the prospect are very near the spectator, and others very distant from him; because, in this case, regard must be had to the conical or conoidal figure of a surface. A right line passing at a small distance from the observer, and below the level of his eye, in that case almost always appears sensibly curved at a certain distance from the eye; and almost all figures, in this case, are subject to some complicated optical alteration to which the rules of perspective have not as yet been extended. If a circle be drawn near our feet, and within that part of the ground which always appears level to us, it will always appear to be a circle, and at a very considerable distance it will appear an ellipse; but between those two situations, it will not appear to be either the one or the other, but will be like one of those ovals of Descartes, which is more curved on one of its sides than the other.

On these principles a portiere, which appears distorted when it is seen in a low situation, appears perfectly regular when it is viewed from a balcony or any other eminence. Still, however, the apparent irregularity takes place at a greater distance, while the part that is near the spectator is exempt from it. If AB, fig. 5. be the ground plane, and Aa be a perpendicular, under the eye, the higher it is situated, at O, to the greater distance will T, the place at which the plane begins to have an apparent ascent along T b , be removed.

All the varieties that can occur with respect to the visible motion of objects, are succinctly summed up by Dr Porterfield under 11 heads, with which we shall present our readers.

1. An object moving very swiftly is not seen, unless it be very luminous. Thus a cannon-ball is not seen if it is viewed transversely: but if it be viewed according to the line it describes, it may be seen, because its picture continues long on the same place of the retina; which, therefore, receives a more sensible impression from the object.

2. A live coal swung briskly round in a circle appears a continued circle of fire, because the impressions made on the retina by light, being of a vibrating, and consequently of a lasting nature, do not presently perish, but continue till the coal performs its whole circuit, and returns again to its former place.

3. If two objects, unequally distant from the eye, move with equal velocity, the more remote one will appear the slower; or, if their celerities be proportional to their distances, they will appear equally swift.

4. If two objects, unequally distant from the eye, move with unequal velocities in the same direction, their apparent velocities are in a ratio compounded of the direct ratio of their true velocities, and the reciprocal

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procal one of their distances from the eye.

5. A visible object moving with any velocity appears to be at rest, if the space described in the interval of one second be imperceptible at the distance of the eye. Hence it is that a near object moving very slowly, as the index of a clock, or a remote one very swiftly, as a planet, seems to be at rest.

6. An object moving with any degree of velocity will appear at rest, if the space it runs over in a second of time be to its distance from the eye as 1 to 1400.

7. The eye proceeding straight from one place to another, a lateral object, not too far off, whether on the right or left, will seem to move the contrary way.

8. The eye proceeding straight from one place to another, and being sensible of its motion, distant objects will seem to move the same way, and with the same velocity. Thus, to a person running eastwards, the moon on his right hand appears to move the same way, and with equal swiftness; for, by reason of its distance, its image continues fixed upon the same place of the retina, from whence we imagine that the object moves along with the eye.

9. If the eye and the object move both the same way, only the eye much swifter than the object, the last will appear to go backwards.

10. If two or more objects move with the same velocity, and a third remain at rest, the moveable ones will appear fixed, and the quiescent in motion, the contrary way. Thus clouds moving very swiftly, their parts seem to preserve their situation, and the moon to move the contrary way.

11. If the eye be moved with great velocity, lateral objects at rest appear to move the contrary way. Thus to a person sitting in a coach, and riding briskly through a wood, the trees seem to retire the contrary way; and to people in a ship, &c. the shores seem to recede.

At the conclusion of these observations, our author endeavours to explain another phenomenon of motion, which, though very common and well known, had not, as far as he knew, been explained in a satisfactory manner. It is this: If a person turns swiftly round, without changing his place, all objects about will seem to move round in a circle the contrary way; and this deception continues not only while the person himself moves round, but, which is more surprising, it also continues for some time after he ceases to move, when the eye; as well as the object, is at absolute rest.

The reason why objects appear to move round the contrary way, when the eye turns round, is not so difficult to explain: for though, properly speaking, motion is not seen, as not being in itself the immediate object of sight; yet by the sight we easily know when the image changes its place on the retina, and thence conclude that either the object, the eye, or both, are moved. But by the sight alone we can never determine how far this motion belongs to the object, how far to the eye, or how far to both. If we imagine the eye at rest, we ascribe the whole motion to the object, though it be truly at rest. If we imagine the object at rest, we ascribe the whole motion to the eye, though it belongs entirely to the object; and when the eye is in motion, though we are sensible of its

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of objects.

motion, yet, if we do not imagine that it moves so swiftly as it really does, we ascribe only a part of the motion to the eye, and the rest of it we ascribe to the object, though it be truly at rest. This last, he says, is what happens in the present case, when the eye turns round; for though we are sensible of the motion of the eye, yet we do not apprehend that it moves so fast as it really does; and therefore the bodies about appear to move the contrary way, as is agreeable to experience.

But the great difficulty still remains, viz. Why, after the eye ceases to move, objects should, for some time, still appear to continue in motion, though their pictures on the retina be truly at rest, and do not at all change their place. This, he imagined, proceeds from a mistake we are in with respect to the eye, which, though it be absolutely at rest, we nevertheless conceive it as moving the contrary way to that in which it moved before; from which mistake, with respect to the motion of the eye, the objects at rest will appear to move the same way which the eye is imagined to move; and, consequently, will seem to continue their motion for some time after the eye is at rest.

M. Le Cat well explains a remarkable deception, by which a person shall imagine an object to be on the opposite side of a board, when it is not so, and also inverted, and magnified. It is illustrated by fig. 3. in which D represents the eye, and CB a large black board, pierced with a small hole. E is a large white board, placed beyond it, and strongly illuminated; and *d* a pin, or other small object, held betwixt the eye and the first board. In these circumstances, the pin shall be imagined to be at F, on the other side of the board, where it will appear inverted, and magnified; because what is in fact perceived, is the shadow of the pin upon the retina; and the light that is stopped by the upper part of the pin coming from the lower part of the enlightened board, and that which is stopped by the lower part coming from the upper part of the board, the shadow must necessarily be inverted with respect to the object.

There is a curious phenomenon relating to vision, which some persons have ascribed to the inflection of light, but which Mr Melville explains in a very different and very simple manner.

When any opaque body is held at the distance of three or four inches from the eye, so that a part of some more distant luminous object, such as the window, or the flame of a candle, may be seen by rays passing near its edge, if another opaque body, nearer to the eye, be brought across from the opposite side, the edge of the first body will seem to swell outwards, and meet the latter; and in doing so will intercept a portion of the luminous object that was seen before.

This appearance he explains in the following manner: Let AB, fig. 1. represent the luminous object, to which the light is directed, CD the more distant opaque body, GH the nearer, and EF the diameter of the pupil. Join ED, FD, EG, FG, and produce them till they meet AB in K, N, M, and L. It is plain that the parts AN, MB, of the luminous object cannot be seen. But taking any point *a* between N and K, and drawing *aDd*, since the portion *dF* of the

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Fig. 8.

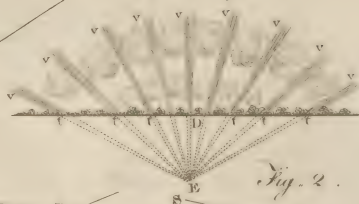


Fig. 2.

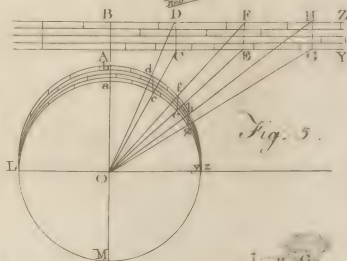


Fig. 5.

Fig. 4.

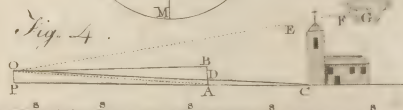


Fig. 1.

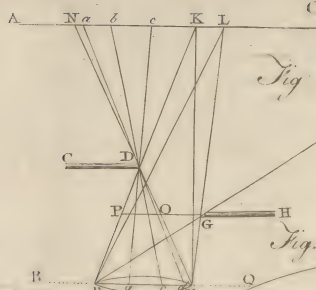


Fig. 6.

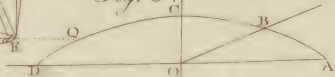


Fig. 7.

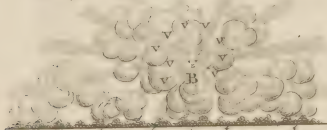


Fig. 3.

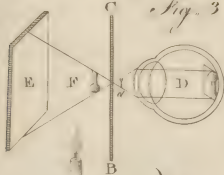
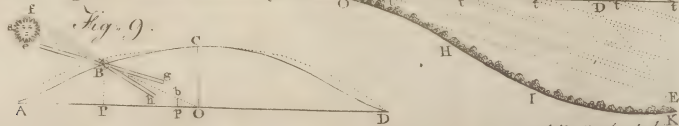


Fig. 10.

Fig. 9.



Concavity of the Sky. the pupil is filled with light flowing from that point, it must be visible. Any point *b*, between *a* and *K*, must fill *fF*, a greater portion of the pupil, and therefore must appear brighter. Again, any point *c*, between *b* and *K*, must appear brighter than *b*, because it fills a greater portion *gF* with light. The point *K* itself, and every other point in the space *KL*, must appear very luminous, since they fend entire pencils of rays *EKF*, *ELF*, to the eye; and the visible brightness of every point from *L* towards *M*, must decrease gradually, as from *K* to *N*; that is, the spaces *KN*, *LM*, will appear as dim shadowy borders, or fringes, adjacent to the edges of the opaque bodies.

When the edge *G* is brought to touch the right line *KF*, the penumbras unite; and as soon as it reaches *NDF*, the above phenomenon begins; for it cannot pass that right line without meeting some line *aDd*, drawn from a point between *N* and *K*, and, by intercepting all the rays that fall upon the pupil, render it invisible. In advancing gradually to the line *KDE*, it will meet other lines *bDf*, *cDg*, &c. and therefore render the points *b*, *c*, &c. from *N* to *K*, successively invisible; and therefore the edge of the fixed opaque body *CD* must seem to swell outwards, and cover the whole space *NK*; while *GH*, by its motion, covers *MK*. When *GH* is placed at a greater distance from the eye, *CD* continuing fixed, the space *OP* to be passed over in order to intercept *NK* is less; and therefore, with an equal motion of *GH*, the apparent swelling of *CD* must be quicker; which is found true by experience.

If *ML* represent a luminous object, and *REFQ* any plane exposed to its light, the space *FQ* will be entirely shaded from the rays, and the space *FE* will be occupied by a penumbra, gradually darker, from *E* to *F*. Let now *GH* continue fixed, and *CD* move parallel to the plane *EF*; and as soon as it passes the line *LF*, it is evident that the shadow *QF* will seem to swell outwards; and when *CD* reaches *ME*, so as to cover with its shadow the space *RE*, *QF*, by its extension, will cover *FE*. This is found to hold true likewise by experiment.

§ 4. Of the Concave Figure of the Sky.

This apparent concavity is only an optical deception founded on the incapacity of our organs of vision to take in very large distances.—Dr Smith, in his Complete System of Optics, hath demonstrated, that, if the surface of the earth was perfectly plane, the distance of the visible horizon from the eye would scarce exceed the distance of 5000 times the height of the eye above the ground, supposing the height of the eye between five and six feet: beyond this distance, all objects would appear in the visible horizon. For, let *OP* be the height of the eye above the line *PA* drawn upon the ground; and if an object *AB*, equal in height to *PO*, be removed to a distance *PA* equal to 5000 times that height, it will hardly be visible by reason of the smallness of the angle *AOB*. Consequently any distance *AC*, how great soever, beyond *A*, will be invisible. For since *AC* and *BO* are parallel, the ray *CO* will always cut *AB* in some point *D* between *A* and *B*; and therefore the angle *AOC*, or *AOD*, will always be less than *AOB*, and

therefore *AD* or *AC* will be invisible. Consequently all objects and clouds, as *CE* and *FG*, placed at all distances beyond *A*, if they be high enough to be visible, or to subtend a bigger angle at the eye than *AOB*, will appear at the horizon *AB*; because the distance *AC* is invisible.

Hence, if we suppose a vast long row of objects, or a vast long wall *ABZY*, built upon this plane, and its perpendicular distance *OA* from the eye at *O* to the visible horizon, it will not appear straight, but circular, as if it was built upon the circumference of the horizon *acgy*; and if the wall be continued to an immense distance, its extreme parts *YZ*, will appear in the horizon at *yz*, where it is cut by a line *Oy* parallel to the wall. For, supposing a ray *YO*, the angle *YOy* will become insensibly small. Imagine this infinite plane *OAYy*, with the wall upon it, to be turned about the horizontal line *O* like the lid of a box, till it becomes perpendicular to the other half of the horizontal plane *LMY*, and the wall parallel to it, like a vast ceiling over head; and then the wall will appear like the concave figure of the clouds over-head. But though the wall in the horizon appear in the figure of a semicircle, yet the ceiling will not, but much flatter. Because the horizontal plane was a visible surface, which suggested the idea of the same distances quite round the eye: but in the vertical plane extended between the eye and the ceiling, there is nothing that affects the sense with an idea of its parts but the common line *Oy*; consequently the apparent distances of the higher parts of the ceiling will be gradually diminished in ascending from that line. Now when the sky is quite overcast with clouds of equal gravities, they will all float in the air at equal heights above the earth, and consequently will compose a surface resembling a large ceiling, as flat as the visible surface of the earth. Its concavity therefore is not real, but apparent: and when the heights of the clouds are unequal, since their real shapes and magnitudes are all unknown, the eye can seldom distinguish the unequal distances of those clouds that appear in the same directions, unless when they are very near us, or are driven by contrary currents of the air. So that the visible shape of the whole surface remains alike in both cases. And when the sky is either partly overcast, or perfectly free from clouds, it is matter of fact that we retain much the same idea of its concavity as when it was quite overcast.

The concavity of the heavens appears to the eye, which is the only judge of an apparent figure, to be a less portion of a spherical surface than a hemisphere. Dr Smith says, that the centre of the concavity is much than a hemisphere; and by taking a medium among several observations, he found the apparent distance of its parts at the horizon to be generally between three and four times greater than the apparent distance of its parts overhead. For let the arch *ABCD* represent the apparent concavity of the sky, *O* the place of the eye, *OA* and *OC* the horizontal and vertical apparent distances, whose proportion is required. First observe when the sun or the moon, or any cloud or star, is in such a position at *B*, that the apparent arches *BA*, *BC*, extended on each side of this object towards the horizon

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Extent of the visible horizon on a plane surface.

Plate
CCXIV.
fig. 4.

135
Why the concavity of the sky appears less than a hemisphere.

Blue colour
of the Sky.

taking the altitude of the object B with a quadrant, or a cross-staff, or finding it by astronomy from the given time of observation, the angle AOB is known. Drawing therefore the line OB in the position thus determined, and taking in it any point B at pleasure in the vertical line CO produced downwards, seek the centre E of a circle ABC, whose arches BA, BC, intercepted between B and the legs of the right angle AOC, shall be equal to each other; then will this arch ABCD represent the apparent figure of the sky. For by the eye we estimate the distance between any two objects in the heavens by the quantity of sky that appears to lie between them; as upon earth we estimate it by the quantity of ground that lies between them. The centre E may be found geometrically by constructing a cubic equation, or as quick and sufficiently exact by trying whether the chords BA, BC, of the arch ABC drawn by conjecture are equal, and by altering its radius BE till they are so. Now in making several observations upon the sun, and some others upon the moon and stars, they seemed to our author to bisect the vertical arch ABC at B, when their apparent altitudes or the angle AOB was about 23 degrees; which gives the proportion of OC to OA as 3 to 10 or as 1 to 3 $\frac{1}{3}$ nearly. When the sun was but 30 degrees high, the upper arch seemed always less than the under one; and, in our author's opinion, always greater when the sun was about 18 or 20 degrees high.

§ 5. Of the Blue Colour of the sky, and of Blue and Green Shadows.

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Opinions
of the an-
cients, &c.

THE opinions of ancient writers concerning the colour of the sky merit no notice. The first who gave any rational explanation was Fromondus. By him it was supposed, that the blueness of the sky proceeded from a mixture of the white light of the sun with the black space beyond the atmosphere, where there is neither refraction nor reflection. This opinion prevailed very generally even in modern times, and was maintained by Otto Guericke and all his contemporaries, who asserted that white and black may be mixed in such a manner as to make a blue. Mr Bouguer had recourse to the vapours diffused through the atmosphere, to account for the reflection of the blue rays rather than any other. He seems however to suppose, that it arises from the constitution of the air itself, whereby the fainter coloured rays are incapable of making their way through any considerable tract of it. Hence he is of opinion, that the colour of the air is properly blue; to which opinion Dr Smith seems also to have inclined.

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Green shadows
observed by
M. Buffon.

To this blue colour of the sky is owing the appearance of blue and green shadows in the mornings and evenings.—These were first taken notice of by M. Buffon in the month of July 1742, when he observed that the shadows of trees which fell upon a white wall were green. He was at that time standing upon an eminence, and the sun was setting in the cleft of a mountain, so that he appeared considerably lower than the horizon. The sky was clear, excepting in the west, which, though free from clouds, was lightly shaded with vapours, of a yellow colour, inclining to red. Then the sun itself was exceedingly red, and was

seemingly, at least, four times as large as he appears to be at mid-day. In these circumstances, he saw very distinctly the shadows of the trees, which were 30 or 40 feet from the white wall, coloured with a light green, inclining to blue. The shadow of an arbour, which was three feet from the wall, was exactly drawn upon it, and looked as if it had been newly painted with verdegris. This appearance lasted near five minutes; after which it grew fainter, and vanished at the same time with the light of the sun.

The next morning, at sun rise, he went to observe other shadows, upon another white wall; but instead of finding them green, as he expected, he observed that they were blue, or rather of the colour of lively indigo. The sky was serene, except a slight covering of yellowish vapours in the east; and the sun arose behind a hill, so that it was elevated above his horizon. In these circumstances, the blue shadows were only visible three minutes; after which they appeared black, and in the evening of fame day he observed the green shadows exactly as before. Six days passed without his being able to repeat his observations, on account of the clouds; but the 7th day, at sun-set, the shadows were not green, but of a beautiful sky-blue. He also observed that the sky was, in a great measure, free from vapours at that time; and that the sun set behind a rock, so that it disappeared before it came to his horizon. Afterwards he often observed the shadows both at sun-rise and sun-set; but always observed them to be blue, though with a great variety of shades of that colour. He shewed this phenomenon to many of his friends, who were as much surprised at it as he himself had been; but he says that any person may see a blue shadow, if he will only hold his finger before a piece of white paper at sun-rise or sun-set.

The first person who attempted to explain this phenomenon was the Abbé Mazeas, in a memoir of the society in Berlin for the year 1752. He observed, that when an opaque body was illuminated by the moon and a candle at the same time, and the two shadows were cast upon the same white wall, that which was enlightened by the candle was reddish, and that which was enlightened by the moon was blue. But, without attending to any other circumstances, he supposed the change of colour to be occasioned by the diminution of the light; but M. Melville, and M. Bouguer, both independent of one another, seem to have hit upon the true cause of this curious appearance, and which hath been already hinted at. The former of these gentlemen, in his attempts to explain the blue colour of the sky, observes, that since it is certain that no body assumes any particular colour, but because it reflects one sort of rays more abundantly than the rest; and since it cannot be supposed that the constituent parts of pure air are gross enough to separate any colours of themselves; we must conclude with Sir Isaac Newton, that the violet and blue making rays are reflected more copiously than the rest, by the finer vapours diffused through the atmosphere, whose parts are not big enough to give them the appearance of visible opaque clouds. And he shews, that in proper circumstances, the bluish colour of the sky-light may be actually seen on bodies illuminated by it, as, he says, it is objected should always happen upon this hypothesis. For that, if on a clear cloudless day a sheet

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Blue shadows
observed by
him.

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Explanation
of the phe-
nomenon
attributed
to the Abbé
Mazeas.

241
Melville's
& Bou-
guer's ex-
planation.

Blue colour of white paper be exposed to the sun's beams, when any opaque body is placed upon it, the shadow which is illuminated by the sky only will appear remarkably bluish compared with the rest of the paper, which receives the sun's direct rays.

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M. Beguelin's explanation of the green shadows.

M. Beguelin, who has taken the most pains with this subject, observes, that as M. Buffon mentions the shadows appearing green only twice, and that at all other times they are blue, this is the colour which they regularly have, and that the blue was changed into green by some accidental circumstance. Green, he says, is only a composition of blue and yellow, so that this accidental change may have arisen from the mixture of some yellow rays in the blue shadow; and that perhaps the wall might have had that tinge, so that the blue is the only colour for which a general reason is required. And this, he says, must be derived from the colour of pure air, which always appears blue, and which always reflects that colour upon all objects without distinction; but which is too faint to be perceived when our eyes are strongly affected by the light of the sun, reflected from other objects around us.

To confirm this hypothesis, he adds some curious observations of his own, in which this appearance is agreeably diversified. Being at the village of Boucholtz in July 1764, he observed the shadows projected on the white paper of his pocket-book, when the sky was clear. At half an hour past 6 in the evening, when the sun was about four degrees high, he observed that the shadow of his finger was of a dark grey, while he held the paper opposite to the sun; but when he inclined it almost horizontally, the paper had a bluish cast, and the shadow upon it was of a beautiful bright blue.

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Some curious phenomena observed by him.

When his eye was placed between the sun and the paper laid horizontally, it always appeared of a bluish cast; but when he held the paper, thus inclined, between his eye and the sun, he could distinguish, upon every little eminence occasioned by the inequality of the surface of the paper, the principal of the prismatic colours. He also perceived them upon his nails, and upon the skin of his hand. This multitude of coloured points, red, yellow, green, and blue, almost effaced the natural colour of the objects.

At three quarters past six, the shadows began to be blue, even when the rays of the sun fell perpendicularly. The colour was the most lively when the rays fell upon it at an angle of 45° degrees; but with a less inclination of the paper, he could distinctly perceive, that the blue shadow had a border of a stronger blue, on that side which looked towards the sky, and a red border on that side which was turned towards the earth. To see these borders, the body that made the shadow was obliged to be placed very near the paper; and the nearer it was, the more sensible was the red border. At the distance of three inches, the whole shadow was blue. At every observation, after having held the paper towards the sky, he turned it towards the earth, which was covered with verdure; holding it in such a manner, that the sun might shine upon it while it received the shadows of various bodies, but, in this position, he could never perceive the shadow to be blue or green at any inclination with respect to the sun's rays.

At seven o'clock, the sun being still about two de-

grees high, the shadows were of a bright blue, even when the rays fell perpendicularly upon the paper, but were the brightest when it was inclined at an angle of 45°. At this time he was surprised to observe, that a large tract of sky was not favourable to this blue colour, and that the shadow falling upon the paper placed horizontally was not coloured, or at least the blue was very faint. This singularity, he concluded, arose from the small difference between the light of that part of the paper which received the rays of the sun, and that which was in the shade in this situation. In a situation precisely horizontal, the difference would vanish, and there could be no shadow. Thus too much or too little of the sun's light produced, but for different reasons, the same effect; for they both made the blue light reflected from the sky to become insensible. This gentleman never saw any green shadows, but when he made them fall on yellow paper. But he does not absolutely say, that green shadows cannot be produced in any other manner; and supposes, that if it was on the same wall that M. Buffon saw the blue shadows, seven days after having seen the green ones, he thinks that the cause of it might be the mixture of yellow rays, reflected from the vapours, which he observes were of that colour.

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Blue shadows not confined to the times of the sun-rising and sun-setting; confined to the morning and evening.

These blue shadows, our author observes, are not confined to the times of the sun-rising and sun-setting; on the 19th of July, when the sun has the greatest force, he observed them at three o'clock in the afternoon, but the sun shone through a mist at that time.

If the sky is clear, the shadows begin to be blue; when, if they be projected horizontally, they are eight times as long as the height of the body that produces them, that is, when the centre of the sun is 7° 8' above the horizon. This observation, he says, was made in the beginning of August.

Besides these coloured shadows, which are produced by the interception of the direct rays of the sun, our author observed others similar to them at ever hour of the day, in rooms into which the light of the sun was reflected from some white body, if any part of the clear sky could be seen from the place, and all unnecessary light was excluded as much as possible. Observing these precautions, he says that the blue shadows may be seen at any hour of the day, even with the direct light of the sun; and that this colour will disappear in all those places of the shadow from which the blue sky cannot be seen.

All the observations that our author made upon the yellow or reddish borders of shadows above-mentioned, led him to conclude, that they were occasioned by the interception of the sky-light, whereby part of the shadow was illuminated either by the red rays reflected from the clouds, when the sun is near the horizon, or from some terrestrial bodies in the neighbourhood. This conjecture is favoured by the necessity he was under of placing any body near the paper, in order to produce this bordered shadow, as he says it is easily demonstrated, that the interception of the sky-light can only take place when the breadth of the opaque body is to its distance from the white ground on which the shadow falls, as twice the sine of half the amplitude of the sky to its cosine.

At the conclusion of his observations on these blue shadows,

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Another kind.

Irradiations
of the Sun's
Light, &c.

shadows, he gives a short account of another kind of them, which, he does not doubt, have the same origin. These he often saw early in the spring when he was reading by the light of a candle in the morning, and consequently the twilight mixed with that of his candle. In these circumstances, the shadow that was made by intercepting the light of his candle, at the distance of about six feet, was of a beautiful and clear blue, which became deeper as the opaque body which made the shadow was brought nearer to the wall, and was exceedingly deep at the distance of a few inches only. But wherever the day-light did not come, the shadows were all black without the least mixture of blue.

§ 6. *Of the Irradiations of the Sun's Light appearing through the interfaces of the Clouds.*

This is an appearance which every one must have observed when the sky was pretty much overcast with clouds at some distance from each other. At that time several large beams of light, something like the appearance of the light of the sun admitted into a smoky room, will be seen, generally with a very considerable degree of divergence, as if the radiant point was situated at no great distance above the clouds. Dr Smith observes, that this appearance is one of those which serve to demonstrate that very high and remote objects in the heavens do not appear to us in their real shapes and positions, but according to their perspective projections on the apparent concavity of the sky. He acquaints us, that though these beams are generally seen diverging, as represented in fig. 7. it is not always the case. He himself, in particular, once saw them converging towards a point diametrically opposite to the sun: for, as near as he could conjecture, the point to which they converged was situated as much below the horizon, as the sun was then elevated above the opposite part of it. This part is represented by the line tDz , and the point below it in opposition to the sun is E ; towards which all the beams $vt, vt, \&c.$ appeared to converge.

Plate
CCXIV.

146
Converging
irradiations
observed by
Dr Smith.

Fig. 8.

147
The pheno-
menon ex-
plained by
him.

“ Observing, (says our author,) that the point of convergence was opposite to the sun, I began to suspect that this unusual phenomenon was but a case of the usual apparent divergence of the beams of the sun from his apparent place among the clouds, as represented in fig. 7. I say, an apparent divergence; for though nothing is more common than for rays to diverge from a luminous body, yet the divergence of these beams in such large angles is not real but apparent. Because it is impossible for the direct rays of the sun to cross one another at any point of the apparent concavity of the sky, in a greater angle than about half a degree. For the diameter of the earth being so extremely small, in comparison to the distance of the sun, as to subtend an angle at any point of his body of but 20 or 22 seconds at most; and the diameter of our visible horizon being extremely smaller than that of the earth; it is plain, that all the rays which fall upon the horizon, from any given point of the sun, must be inclined to each other in the smallest angles imaginable; the greatest of them being as much smaller than that angle of 22 seconds, as the diameter of the visible horizon is smaller than that of the earth. All the rays that come to us from any given point of the sun may therefore be consid-

ed as parallel to each other; as the rays eBg from the point e , or fBh from the opposite point f ; and consequently the rays of these two pencils that come from opposite points of the sun's real diameter, and cross each other in the sun's apparent place B among the clouds, can constitute no greater an angle with each other than about half a degree; this angle of their intersection eBf being the same as the sun would appear under to an eye placed among the clouds at B , or (which is much the same), to an eye at O upon the ground. Because the sun's real distance OS is inconceivably greater than his apparent distance OB . Therefore the rays of the sun, as Bg, Bh , do really diverge from his apparent place B in no greater angles gBh than about half a degree. Nevertheless they appear to diverge from the place B in all possible angles, and even in opposite directions. Let us proceed then to an explanation of this apparent divergence, which is not self-evident by any means; though at first sight we are apt to think it is, by not distinguishing the vast difference between the true and apparent distances of the sun.

“ What I am going to demonstrate is this. Supposing all the rays of the sun to fall accurately parallel to each other upon the visible horizon, as they do very nearly, yet in both cases they must appear to diverge in all possible angles. Let us imagine the heavens to be partly overcast with a spacious bed of broken clouds, $v, v, v, \&c.$ lying parallel to the plane of the visible horizon, here represented by the line AOD . And when the sun's rays fall upon these clouds in the parallel lines $sv, sv, \&c.$ let some of them pass through their intervals in the lines $vt, vt, \&c.$ and fall upon the plane of the horizon at the places $t, t, \&c.$ And since the rest of the incident rays sv, sv , are supposed to be intercepted from the place of the spectator at O by the cloud x , and from the intervals between the transmitted rays $vt, vt, \&c.$ by the clouds $v, v, \&c.$ a small part of these latter rays vt, vt , when reflected every way from some certain kind of thin vapours floating in the air, may undoubtedly be sufficient to affect the eye with an appearance of lights and shades, in the form of bright beams in the places $vt, vt, \&c.$ and of dark ones in the intervals between them: just as the like beams of light and shade appear in a room by reflections of the sun's rays from a smoky or dusty air within it: the lights and shades being here occasioned by the transmission of the rays through some parts of the window, and by their interruption at other parts.

“ Now if the apparent concavity of this bed of clouds v, v , to the eye at O , be represented by the arch $ABCD$, and be cut in the point B by the line OBx drawn parallel to the beams sv ; it will be evident by the rules of perspective, that these long beams will not appear in their real places, but upon the concave $ABCD$ diverging every way from the place B , where the sun himself appears, or the cloud x that covers his body, as represented separately in full view in fig. 7.

“ And for the same reason, if the line BO be produced towards E , below the plane of the horizon AOD , and the eye be directed towards the region of the sky directly above E , the lower ends of the same real beams vt, vt , will now appear upon the part DE of this concave; and will seem to converge towards the point situated just as much below the horizon as the opposite

Irradiations
of the Sun's
Light, &c.
Fig. 9.

Fig. 10.

Fig. 1.

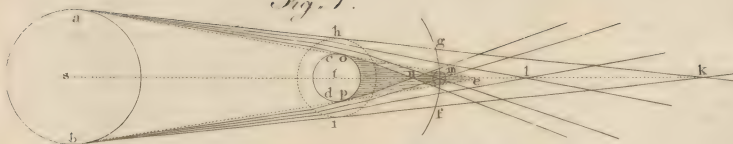


Fig. 2.

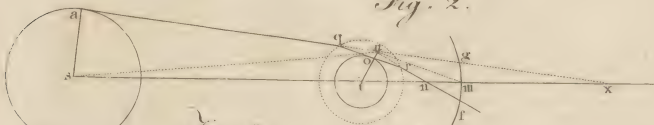


Fig. 3.



Fig. 4.

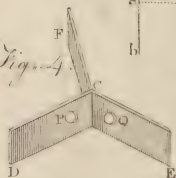


Fig. 5.

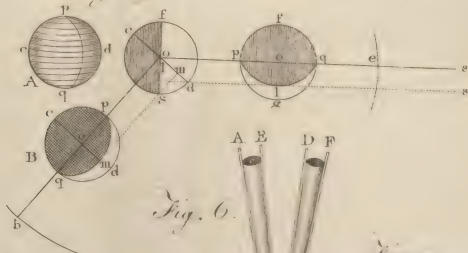


Fig. 6.

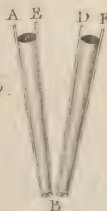


Fig. 7.

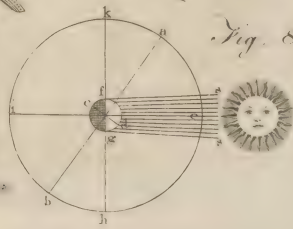
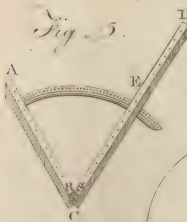
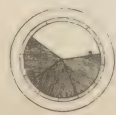


Fig. 9.



Irradiations
of the Sun's
Light, &c.

Illumina-
tion of the
Earth's
Shadow.

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Explained
by Dr
Smith.

Plate
CCXV.
fig. 1.

145
Not obser-
ved by
moon light.

149
More fre-
quent in
summer
than in
winter.

posite point B is above it: which is separately repre-
sented in full view in fig. 8.

"For if the beams vt , vt , be supposed to be visible
throughout their whole lengths, and the eye be direc-
ted in a plane perpendicular to them, here represented
by the line OP ; they and their intervals will appear
broadest in and about this plane, because these parts
of them are the nearest to the eye; and therefore their
remoter parts and intervals will appear gradually nar-
rower towards the opposite ends of the line BE . As
a farther illustration of this matter, we may conceive
the spectator at O to be situated upon the top of so
large a descent OHI towards a remote valley IK , and
the sun to be so very low, that the point E , opposite
to him, may be seen above the horizon of this shady
valley. In this case it is manifest, that the spectators at
 O would now see these beams converging so far as to
meet each other at the point E in the sky itself.

"I do not remember to have ever seen any phenom-
enon of this kind by moon-light; not so much as of
beams diverging from her apparent place. Probably
her light is too weak after reflections from any kind
of vapours, to cause a sensible appearance of lights and
shades so as to form these beams. And in the unusual
phenomenon I well remember, that the converging
sun-beams towards the point below the horizon were
not quite so bright and strong as those usually are that
diverge from him; and that the sky beyond them ap-
peared very black (several showers having passed that
way), which certainly contributed to the evidence of
this appearance. Hence it is probable that the thin-
ness and weakness of the reflected rays from the vapours
opposite to the sun, is the chief cause that this
appearance is so very uncommon in comparison to that
of other diverging beams. For as the region of the
sky round about the sun, is always brighter than the
opposite one; so the light of the diverging beams
ought also to be brighter than that of the converging
ones. For, though rays are reflected from rough un-
polished bodies in all possible directions, yet it is a ge-
neral observation, that more of them are reflected for-
wards obliquely, than are reflected more directly back-
wards. Besides, in the present case, the incident rays
upon the opposite region to the sun, are more dimi-
nished by continual reflections from a longer tract
of the atmosphere, than the incident rays upon the region
next the sun.

"The common phenomenon of diverging beams, I
think, is more frequent in summer than in winter, and
also when the sun is lower than when higher up; prob-
ably because the lower vapours are denser and there-
fore more strongly reflective than the higher; be-
cause the lower sky-light is not so bright as the upper;
because the air is generally quieter in the morn-
ings and evenings than about noon-day; and lastly,
because many sorts of vapours are exhaled in greater
plenty in summer than in winter, from many kinds of
volatile vegetables; which vapours, when the air is
cooled and condensed in the mornings and evenings,
may become dense enough to reflect a sensible light."

§ 7. *Of the Illumination of the Shadow of the Earth by the refraction of the Atmosphere.*

THE ancient philosophers, who knew nothing of the
refractive power of the atmosphere, were very much
perplexed to account for the body of the moon being

visible when totally eclipsed. At such times she gene-
rally appears of a dull red colour, like tarnished cop-
per, or of iron almost red hot. This, they thought,
was the moon's native light, by which she became vi-
sible when hid from the brighter light of the sun.
Plutarch indeed, in his discourse upon the face of the
moon, attributes this appearance to the light of the
fixed stars reflected to us by the moon; but this must
be by far too weak to produce that effect. The true
cause of it is the scattered beams of the sun bent into
the earth's shadow by refractions through the atmo-
sphere in the following manner.

"Let the body of the sun, says Dr Smith, be repre-
sented by the greater circle ab , and that of the earth by
the lesser one cd ; and let the lines ace and bde touch
them both on their opposite sides, and meet in e beyond
the earth; then the angular space ced will represent the
conic figure of the earth's shadow, which would be to-
tally deprived of the sun's rays, were none of them
bent into it by the refractive power of the atmosphere.
Let this power just vanish at the circle hi , concentric
to the earth, so that the rays ab and bi , which touch
its opposite sides, may proceed unrefracted, and meet
each other at k . Then the two nearest rays to these
that flow within them, from the same points a and b ,
being refracted inwards through the margin of the at-
mosphere, will cross each other at a point l , somewhat
nearer to the earth than k ; and in like manner, two
opposite rays next within the two last will cross each
other at a point m , somewhat nearer to the earth than
 l , having suffered greater refractions, by passing thro'
longer and denser tracts of air lying somewhat nearer
to the earth. The like approach of the successive in-
tersections k , l , m , is to be understood of innumerable
couple of rays, till you come to the intersection n of
the two innermost; which we may suppose just to touch
the earth at the points o and p . It is plain then, that
the space bounded by these rays on , np , will be the only
part of the earth's shadow wholly deprived of the sun's
rays. Let smg represent part of the moon's orbit
when it is nearest to the earth, at a time when the
earth's dark shadow onp is the longest; in this case I
will shew that the ratio of tm to tn is about 4 to 3;
and consequently that the moon, tho' centrally eclipsed
at m , may yet be visible by means of those scatter-
ed rays above-mentioned, first transmitted to the moon
by refraction through the atmosphere, and from thence
reflected to the earth.

"For let the incident and emergent parts ag , rn , Fig. 2.
of the ray $agorn$, that just touches the earth at o , be
produced till they meet at u , and let qu produced
meet the axis st produced in x ; and joining u and
 um , since the refractions of an horizontal ray passing
from o to r , or from o to g , would be alike and equal, the
external angle nux is double the quantity of the usual
refraction of an horizontal ray; and the angle aut is
the apparent measure of the sun's semidiameter seen
from the earth; and the angle ust is that of the earth's
semidiameter tu seen from the sun (called his *horizontal
parallax*); and lastly, the angle umt is that of the
earth's semidiameter seen from the moon, (called her
horizontal parallax); because the elevation of the point
 u above the earth, is too small to make a sensible er-
ror in the quantity of these angles; whose measures by
astronomical tables are as follow:

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The sun's least apparent semidiameter	= ang. $aus = 15-50$
The sun's horizontal parallax	= ang. $ust = 00-10$
Their difference is	= ang. $txu = 15-40$
Double the horizontal refraction	= ang. $nux = 67-30$
Their sum is	= ang. $tnu = 83-10$
The moon's greatest horizontal parallax	= ang. $tmu = 62-10$

Therefore we have $tm : tn :: (\text{ang. } tnu : \text{ang. } tmu :: 83-10 : 62-10 :: 4 : 3 \text{ in round numbers ; which was to be proved. It is easy to collect from the moon's greatest horizontal parallax of } 62-10, \text{ that her least distance } tm \text{ is about } 55\frac{1}{2} \text{ semidiameters of the earth; and therefore the greatest length } tn \text{ of the dark shadow, being three quarters of } tm, \text{ is about } 41\frac{1}{2} \text{ semidiameters.}$

"The difference of the last mentioned angles tnu , tmu , is $mun=21$, that is, about two thirds of $31-40$, the angle which the whole diameter of the sun subtends at u . Whence it follows, that the middle point m of the moon centrally eclipsed, is illuminated by rays which come from two thirds of every diameter of the sun's disk, and pass by one side of the earth; and also by rays that come from the opposite two thirds of every one of the said diameters, and pass by the other side of the earth. This will appear by conceiving the ray $agorn$ to be inflexible, and its middle point o to slide upon the earth, while the part ru is approaching to touch the point m ; for then the opposite part qa will trace over two thirds of the sun's diameter. The true proportion of the angles nux , aus , could not be preserved in the scheme, by reason of the sun's immense distance and magnitude with respect to the earth.

"Having drawn the line atz , is is observable, that all the incident rays, as aq , ax , flowing from any one point of the sun to the circumference of the earth, will be collected to a focus z , whose distance tz is less than tm in the ratio of 62 to 67 nearly; and thus an image of the sun will be formed at az , whose rays will diverge upon the moon. For the angle txu is the difference of the angles xuz , ust found above; and $tx : tm :: \text{ang. } tmu : \text{ang. } tnu :: 62-10 : 83-10 :: 67-30$."

"The rays that flow next above aq and ax , by passing through a thinner part of the atmosphere, will be united at a point in the axis atz somewhat farther from the earth than the last focus z ; and the same may be said of the rays that pass next above these, and so on; whereby an infinite series of images of the sun will be formed, whose diameters and degrees of brightness will increase with their distances from the earth.

"Hence it is manifest why the moon eclipsed in her perigee is observed to appear always duller and darker than in her apogee. The reason why her colour is always of the copper kind between a dull red and orange, I take to be this. The blue colour of a clear sky shews manifestly that the blue-making rays are more copiously reflected from pure air than those of any other colour; consequently they are less copiously transmitted through it among the rest that come from the sun, and so much the less as the tract of air thro' which they pass is the longer. Hence the common colour of the sun and moon is whitest in the meridian, and grows gradually more inclined to diluted yellow,

orange, and red, as they descend lower, that is, as the rays are transmitted through a longer tract of air; which tract being still lengthened in passing to the moon and back again, causes a still greater loss of the blue-making rays in proportion to the rest; and so the resulting colour of the transmitted rays must lie between a dark orange and red, according to Sir Isaac Newton's rule for finding the result of a mixture of colours. We have an instance of the reverse of this case in leaf-gold, which appears yellow by reflected, and blue by transmitted rays. The circular edge of the shadow in a partial eclipse appears red; because the red-making rays are the least refracted of all others, and consequently are left alone in the conical surface of the shadow, all the rest being refracted into it.

§ 8. Of the Measures of Light.

THAT some luminous bodies give a stronger, and others a weaker light, and that some reflect more light than others, was always obvious to mankind; but no person, before Mr Bouguer, hit upon a tolerable method of ascertaining the proportion that two or more lights bear to one another. The methods he most commonly used were the following.

He took two pieces of wood or pasteboard EC and CD, fig. 4. in which he made two equal holes P and Q, over which he drew pieces of oiled or white paper. Upon these holes he contrived that the light of the different bodies he was comparing should fall; while he placed a third piece of pasteboard FC, to prevent the two lights from mixing with one another. Then placing himself sometimes on one side, and sometimes on the other, but generally on the opposite side of this instrument, with respect to the light, he altered their position till the papers in the two holes appeared to equally enlighten. This being done, he computed the proportion of their light by the squares of the distances at which the luminous bodies were placed from the objects. If, for instance, the distances were as three and nine, he concluded that the light they gave were as nine and eighty-one. Where any light was very faint, he sometimes made use of lenses, in order to condense it; and he inclosed them in tubes or not, as his particular application of them required.

To measure the intensity of light proceeding from the heavenly bodies, or reflected from any part of the sky, he contrived an instrument which resembles a kind of portable camera obscura. He had two tubes, of which the inner was black, fastened at their lower extremities by a hinge C, fig. 5. At the bottom of these tubes were two holes, R and S, three or four lines in diameter, covered with two pieces of fine white paper. The two other extremities had each of them a circular aperture, an inch in diameter; and one of the tubes consisted of two, one of them sliding into the

Plate CCXV. fig. 3.

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Why the moon appears duller when eclipsed in her perigee than in her apogee.

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Mr Bouguer's contrivances for measuring light. Plate CCXV.

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Light.

the other, which produced the same effect as varying the aperture at the end. When this instrument is used, the observer has his head, and the end of the instrument C, covered, that no light can fall upon his eye, besides that which comes thro' the two holes S and R, while an assistant manages the instrument, and draws out or shortens the tube DE, as the observer directs. When the two holes appear equally illuminated, the intensity of the lights is judged to be inversely as the squares of the tubes.

In using this instrument, it is necessary that the object should subtend an angle larger than the aperture A or D, seen from the other end of the tube; for, otherwise, the lengthening of the tube has no effect. To avoid, in this case, making the instrument of an inconvenient length, or making the aperture D too narrow, he has recourse to another expedient. He constructs an instrument, represented fig. 6. consisting of two object-glasses, AE and DF, exactly equal, fixed in the ends of two tubes six or seven feet, or, in some cases, 10 or 12 feet long, and having their foci at the other ends. At the bottom of these tubes B, are two holes, three or four lines in diameter, covered with a piece of white paper; and this instrument is used exactly like the former.

If the two objects to be observed by this instrument be not equally luminous, the light that issues from them must be reduced to an equality, by diminishing the aperture of one of the object-glasses; and then the remaining surface of the two glasses will give the proportion of their lights. But for this purpose, the central parts of the glasses must be covered in the same proportion with the parts near the circumference, leaving the aperture such as is represented fig. 7. because the middle part of the glass is thicker and less transparent than the rest.

If all the objects to be observed lie nearly in the same direction, our author observes, that these two long tubes may be reduced into one, the two object-glasses being placed close together, and one eye-glass sufficing for them both. The instrument will then be the same with that of which he published an account in 1748, and which he called a *heliometer*, or *astrometer*.

Our author observes, that it is not the absolute quantity, but only the intensity of the light, that is measured by these two instruments, or the number of rays, in proportion to the surface of the luminous body; and it is of great importance that these two things be distinguished. The intensity of light may be very great, when the quantity, and its power of illuminating other bodies, may be very small, on account of the smallness of its surface; or the contrary may be the case, when the surface is large.

Having explained these methods which M. Bouguer took to measure the different proportions of light, we shall subjoin in this place a few miscellaneous examples of his application of them.

It is observable, that when a person stands in a place where there is a strong light, he cannot distinguish objects that are placed in the shade; nor can he see any thing upon going immediately into a place where there is very little light. It is plain, therefore, that the action of a strong light upon the eye, and also the impression which it leaves upon it, makes it insensible

to the effect of a weaker light. M. Bouguer had the curiosity to endeavour to ascertain the proportion between the intensities of the two lights in this case; and by throwing the light of two equal candles upon a board, he found that the shadow made by intercepting the light of one of them, could not be perceived by his eye, upon the place enlightened by the other, at little more than eight times the distance; from whence he concluded, that when one light is eight times eight, or 64 times less than another, its presence or absence will not be perceived. He allows, however, that the effect may be different on different eyes; and supposes that the boundaries in this case, with respect to different persons, may lie between 60 and 80.

Applying the two tubes of his instrument, mentioned above, to measure the intensity of the light reflected from different parts of the sky; he found, that when the sun was 25 degrees high, the light was four times stronger at the distance of eight or nine degrees from his body, than it was at 31 or 32 degrees. But what struck him the most was to find, that when the sun is 15 or 20 degrees high, the light decreases on the same parallel to the horizon to 110 or 120 degrees, and then increases again to the place exactly opposite to the sun.

The light of the sun, our author observes, is too strong, and that of the stars too weak, to determine the variation of their light at different altitudes: but as, in both cases, it must be in the same proportion with the diminution of the light of the moon in the same circumstances, he made his observations on that luminary, and found, that its light at 19° 16', is to its light at 66° 11', as 1681 to 2500; that is, the one is nearly two thirds of the other. He chose those particular altitudes, because they are those of the sun at the two solstices at Croix, where he then resided. When one limb of the moon touched the horizon of the sea, its light was 2000 times less than at the altitude of 66° 11'. But this proportion he acknowledges must be subject to many variations, the atmosphere near the earth varying so much in its density. From this observation he concludes, that at a medium light is diminished in the proportion of about 2500 to 1681, in traversing 7469 toises of dense air.

Lastly, our accurate philosopher applied his instrument to the different parts of the sun's disk, and found that the centre is considerably more luminous than the extremities of it. As near as he could make the observation, it was more luminous than a part of the disk of the semi-diameter from it, in the proportion of 28 to 35; which, as he observes, is more than in the proportion of the sines of the angles of obliquity. On the other hand, he observes, that both the primary and secondary planets are more luminous at their edges than near their centres.

The comparison of the light of the sun and moon is a subject that has frequently exercised the thoughts of philosophers; but we find nothing but random conjectures, before our author applied his accurate measures in this case. In general, the light of the moon is imagined to bear a much greater proportion to that of the sun than it really does; and not only are the imaginations of the vulgar, but those of philosophers also, imposed upon with respect to it. It was a great

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Light.154
Great variation of the light of the moon at different altitudes.155
Variation in different parts of the disk of the sun and planets.Plate
CCXV.153
These instruments measure only the intensity of the light.

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surprise to M. De la Hire to find that he could not, by the help of any burning mirror, collect the beams of the moon in a sufficient quantity to produce the least sensible heat. Other philosophers have since made the like attempts with mirrors of greater power, tho' without any greater success; but this will not surprise us, when we see the result of M. Bouguer's observations on this subject.

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Mr Bou-
guer's cal-
culation
concerning
the light
of the
moon.

In order to solve this curious problem concerning the comparison of the light of the sun and moon, he compared each of them to that of a candle in a dark room, one in the day-time, and the other in the night following, when the moon was at her mean distance from the earth; and, after many trials, he concluded that the light of the sun is about 300,000 times greater than that of the moon; which is such a disproportion, that, as he observes, it can be no wonder that philosophers have had so little success in their attempts to collect the light of the moon with burning-glasses. For the largest of them will not increase the light 1000 times; which will still leave the light of the moon, in the focus of the mirror, 300 times less than the intensity of the common light of the sun.

To this account of the proportion of light which we actually receive from the moon, it cannot be displeasing to the reader, if we compare it with the quantity which would have been transmitted to us from that opaque body, if it reflected all the light it receives. Dr Smith thought that he had proved, from two different considerations, that the light of the full moon would be to our day-light as one to about 90,900, if no rays were lost at the moon.

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Dr Smith's
calculation.

In the first place, he supposes that the moon, enlightened by the sun, is as luminous as the clouds are at a medium. He therefore supposed the light of the sun to be equal to that of a whole hemisphere of clouds, or as many moons as would cover the surface of the heavens. But on this Dr Priestley observes, that it is true, the light of the sun shining perpendicularly upon any surface would be equal to the light reflected from the whole hemisphere, if every part reflected all the light that fell upon it; but the light that would in fact be received from the whole hemisphere (part of it being received obliquely) would be only one-half as much as would be received from the whole hemisphere if every part of it shone directly upon the surface to be illuminated.

In his Remarks, par. 97, Dr Smith demonstrates his method of calculation in the following manner:

"Let the little circle $cf dg$ represent the moon's body half enlightened by the sun, and the great circle aeb , a spherical shell concentric to the moon, and touching the earth; ab , any diameter of that shell perpendicular to a great circle of the moon's body, represented by its diameter cd ; e the place of the shell receiving full moon-light from the bright hemisphere fdg . Now, because the surface of the moon is rough like that of the earth, we may allow that the sun's rays, incident upon any small part of it, with any obliquity, are reflected from it every way alike, as if they were emitted. And therefore, if the segment df shone alone, the points a, e , would be equally illustrated by it; and likewise if the remaining bright segment dg shone alone, the points b, e would be equally illustrated by it. Consequently, if the light at the

point a was increased by the light at b , it would be-
come equal to the full moon-light at e . And conceiving the same transfer to be made from every point of the hemispherical surface $bhi k$ to their opposite points in the hemisphere $kaeh$, the former hemisphere would be left quite dark, and the latter would be uniformly illustrated with full moon-light; arising from a quantity of the sun's light, which, immediately before its incidence on the moon, would uniformly illustrate a circular plane equal to a great circle of her body, called her *disk*. Therefore the quantities of light being the same upon both surfaces, the density of the sun's incident light, is to the density of full moon-light, as that hemispherical surface bek is to the said disk; that is, as any other hemispherical surface whose centre is at the eye, to that part of it which the moon's disk appears to possess very nearly, because it subtends but a small angle at the eye: that is, as radius of the hemisphere to the versed sine of the moon's apparent semidiameter, or as 10,000,000 to $1106\frac{2}{3}$ or as 90,400 to 1; taking the moon's mean horizontal diameter to be $16' 7''$.

"Strictly speaking, this rule compares moon-light at the earth with day-light at the moon; the medium of which, at her quadratures, is the same as our day-light; but is less at her full in the duplicate ratio of 365 to 366, or thereabout; that is, of the sun's distances from the earth and full moon: and therefore full-moon light would be to our day-light, as about 1 to 90,900, if no rays were lost at the moon.

"Secondly, I say that full-moon light is to any other moon light as the whole disk of the moon to the part that appears enlightened, considered upon a plane surface. For now let the earth be at b , and let $Fig. 9.$
 dl be perpendicular to fg , and gm to cd : then it is plain, that gl is equal to dm ; and that gl is equal to a perpendicular section of the sun's rays incident upon the arch dg , which at b appears equal to dm ; the eye being unable to distinguish the unequal distances of its parts. In like manner, conceiving the moon's surface to consist of innumerable physical circles parallel to $cf dg$, as represented at A , the same reason holds for every one of these circles as for $cf dg$. It follows then, that the bright part of the surface visible at b , when reduced to a flat as represented at B , by the crescent $p dq mp$, will be equal and similar to a perpendicular section of all the rays incident on that part, represented at C by the crescent $pgqlp$. Now the whole disk being in proportion to this crescent, as the quantities of light incident upon them; and the light falling upon every rough particle, being equally rarified in diverging to the eye at b , considered as equidistant from them all; it follows, that full moon-light is to this moon-light as the whole disk $p dq c$ to the crescent $p dq mp$.

"Therefore, by compounding this ratio with that in the former remark, day light is to moon-light as the surface of an hemisphere whose centre is at the eye, to the part of that surface which appears to be possessed by the enlightened part of the moon.

Mr Michell made his computation in a much more
simple and easy manner, and in which there is much
less danger of falling into any mistake. Considering
the distance of the moon from the sun, and that the
density

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Mr Mi-
chell's cal-
culation.

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fig. 8.

density of the light must decrease in the proportion of the square of that distance, he calculated the density of the sun's light, at that distance, in proportion to its density at the surface of the sun; and in this manner he found, that if the moon reflected all the light it receives from the sun, it would only be the $\frac{1}{45,000}$ th part of the light we receive from the greater luminary. Admitting, therefore, that moon light is only a $\frac{1}{300,000}$ th part of the light of the sun, Mr Michell concludes, that it reflects no more than between the 6th and 7th part of what falls upon it.

SECT. IV. Of Optical Instruments.

§ 1. The Multiplying-glass.

THE multiplying-glass is made by grinding down the round side btk (fig. 1.) of a convex glass AB, into several flat surfaces, as bb, bld, dk . An object C will not appear magnified when seen through this glass by the eye at H; but it will appear multiplied into as many different objects as the glass contains plane surfaces. For, since rays will flow from the object C to all parts of the glass, and each plane surface will refract these rays to the eye, the same object will appear to the eye in the direction of the rays which enter it through each surface. Thus, a ray gIH , falling perpendicularly on the middle surface, will go through the glass to the eye without suffering any refraction; and will therefore shew the object in its true place at C: whilst a ray ab flowing from the same object, and falling obliquely on the plane surface bb , will be refracted in the direction be , by passing through the glass; and, upon leaving it, will go on to the eye in the direction eH ; which will cause the same object C to appear also at E, in the direction of the ray He , produced in the right line Hen . And the ray cd , flowing from the object C, and falling obliquely on the plane surface dk , will be refracted (by passing through the glass, and leaving it at f) to the eye at H; which will cause the same object to appear at D, in the direction $Hfsm$.—If the glass be turned round the line gIH , as an axis, the object C will keep its place, because the surface bld is not removed; but all the other objects will seem to go round C, because the oblique planes, on which the rays $abcd$ fall, will go round by the turning of the glass.

§ 2. Mirrors.

1. *The Plane Mirror, or common Looking-glass.* The image of any object that is placed before a plane mirror, appears as big to the eye as the object itself; and is erect, distinct, and seemingly as far behind the mirror, as the object is before it; and that part of the mirror which reflects the image of the object to the eye (the eye being supposed equally distant from the glass with the object) is just half as long and half as broad as the object itself. Let AB (fig. 3.) be an object placed before the reflecting surface ghi of the plane mirror CD; and let the eye be at o . Let Ahh be a ray of light flowing from the top A of the object and falling upon the mirror at h , and hm be a perpendicular to the surface of the mirror at h ; the ray Ah will be reflected from the mirror to the eye at o , making an angle mh equal to the angle Ahm : then will the

top of the image E appear to the eye in the direction of the reflected ray oh produced to E, where the right line $AhpE$, from the top of the object, cuts the right line ohE , at E. Let Bi be a ray of light proceeding from the foot of the object at B to the mirror at i ; and ni a perpendicular to the mirror from the point i , where the ray Bi falls upon it: this ray will be reflected in the line io , making an angle no , equal the angle Bin , with that perpendicular, and entering the eye at o ; then will the foot F of the image appear in the direction of the reflected ray oi , produced to F, where the right line BF cuts the reflected ray produced to F. All the other rays that flow from the intermediate points of the object AB, and fall upon the mirror between h and i , will be reflected to the eye at o ; and all the intermediate points of the image EF will appear to the eye in the direction of these reflected rays produced. But all the rays that flow from the object, and fall upon the mirror above h , will be reflected back above the eye at o ; and all the rays that flow from the object, and fall upon the mirror below i , will be reflected back below the eye at o ; so that none of the rays that fall above h , or below i , can be reflected to the eye at o ; and the distance between h and i is equal to half the length of the object AB.

Hence it appears, that if a man sees his whole size of a image in a plane looking-glass, the part of the glass looking—that reflects his image must be just half as long and half as broad as himself, let him stand at any distance from it whatever; and that his image must appear just as far behind the glass as he is before it. Thus, the man whose AB (fig 4.) viewing himself in the plane mirror CD, which is just half as long as himself, sees his whole image as at EF, behind the glass, exactly equal to his own size. For, a ray AC proceeding from his eye at A, and falling perpendicularly upon the surface of the glass at C, is reflected back to his eye, in the same line CA; and the eye of his image will appear at E, in the same line produced to E, beyond the glass. And a ray BD, flowing from his foot, and falling obliquely on the glass at D, will be reflected as obliquely on the other side of the perpendicular $a b D$, in the direction DA; and the foot of his image will appear at F, in the direction of the reflected ray AD, produced to F, where it is cut by the right line BGF, drawn parallel to the right line ACE. Just the same as if the glass were taken away, and a real man stood at F, equal in size to the man standing at B: for to his eye at A, the eye of the other man at E would be seen in the direction of the line ACE; and the foot of the man at F would be seen by the eye A, in the direction of the line ADF.

If the glass be brought nearer the man AB, as suppose to cd , he will see his image as at CDG: for the reflected ray CA (being perpendicular to the glass) will shew the eye of the image as at C; and the incident ray Bb, being reflected in the line bA , will shew the foot of his image as at G; the angle of reflection aba being always equal to the angle of incidence Bba ; and so of all the intermediate rays from A to B. Hence, if the man AB advances towards the glass CD, his image will approach towards it; and if he recedes from the glass, his image will also recede from it.

Of Optical Instruments

Plate CCXII.

x60
Why three or four images are seen in plane mirrors.

If the object be placed before a common looking-glass, and viewed obliquely, three, four, or more images of it will appear behind the glass.

To explain this, let $ABCD$ (fig. 11.) represent the glass; and let EF be the axis of a pencil of rays flowing from E , a point in an object situated there. The rays of this pencil will in part be reflected at F , suppose into the line FG . What remains will (after refraction at F , which we do not consider here) pass on to H ; from whence (on account of the quicksilver which is spread over the second surface of glasses of this kind to prevent any of the rays from being transmitted there) they will be strongly reflected to K , where part of them will emerge and enter an eye at L . By this means one representation of the said point will be formed in the line LK produced, suppose in M : Again, another pencil, whose axis is EN , first reflected at N , then at O , and afterwards at P , will form a second representation of the same point at Q : And thirdly, another pencil, whose axis is ER , after reflection at the several points R , S , H , T , V , successively, will exhibit a third representation of the same point at X ; and so on *in infinitum*. The same being true of each point in the object, the whole will be represented in the like manner; but the representations will be faint, in proportion to the number of reflections the rays suffer, and the length of their progress within the glass. We may add to these another representation of the same object in the line LO produced, made by such of the rays as fall upon O , and are from thence reflected to the eye at L .

This experiment may be tried by placing a candle before the glass as at E , and viewing it obliquely, as from L .

2. *Of Concave and Convex Mirrors.* The effects of these in magnifying and diminishing objects have been already in general explained; but for the better understanding the nature of reflecting telescopes, it will still be proper to subjoin the following particular description of the effects of concave ones.

When parallel rays, (fig. 2.) as dfa , Cmb , elc , fall upon a concave mirror AB (which is not transparent, but has only the surface AB of a clear polish) they will be reflected back from that mirror, and meet in a point m , at half the distance of the surface of the mirror from C the centre of its concavity; for they will be reflected at as great an angle from a perpendicular to the surface of the mirror, as they fell upon it with regard to that perpendicular, but on the other side thereof. Thus, let C be the centre of concavity of the mirror AB ; and let the parallel rays dfa , Cmb , and elc , fall upon it at the points a , b , and c . Draw the lines Cia , Cmb , and Cbc , from the centre C to these points; and all these lines will be perpendicular to the surface of the mirror, because they proceed thereto like so many radii or spokes from its centre. Make the angle Cab equal to the angle $d a C$, and draw the line amb , which will be the direction of the ray dfa , after it is reflected from the point a of the mirror: so that the angle of incidence $d a C$, is equal to the angle of reflection $C a b$; the rays making equal angles with the perpendicular Cia on its opposite sides.

Draw also the perpendicular Cbc to the point c , where the ray elc touches the mirror; and having made the angle Cci equal to the angle Cce , draw the

line cm , which will be the course of the ray elc , after it is reflected from the mirror.

The ray Cmb passing thro' the centre of concavity of the mirror, and falling upon it at b , is perpendicular to it; and is therefore reflected back from it in the same line $b m C$.

All these reflected rays meet in the point m ; and in that point the image of the body which emits the parallel rays da , Cb , and ec , will be formed; which point is distant from the mirror equal to half the radius $b m C$ of its concavity.

The rays which proceed from any celestial object may be esteemed parallel at the earth; and therefore the images of that object will be formed at m , when the reflecting surface of the concave mirror is turned directly towards the object. Hence, the focus m of parallel rays is not in the centre of the mirror's concavity, but half way between the mirror and that centre.

The rays which proceed from any remote terrestrial object, are nearly parallel at the mirror: not strictly so, but come diverging to it, in separate pencils, or, as it were, bundles of rays, from each point of the side of the object next the mirror; and therefore they will not be converged to a point at the distance of half the radius of the mirror's concavity from its reflecting surface, but into separate points at a little greater distance from the mirror. And the nearer the object is to the mirror, the farther these points will be from it; and an inverted image of the object will be formed in them, which will seem to hang pendant in the air; and will be seen by an eye placed beyond it (with regard to the mirror) in all respects like the object, and as distinct as the object itself.

Let ACB (fig. 3.) be the reflecting surface of a mirror, whose centre of concavity is at C ; and let the upright object DE be placed beyond the centre C , and send out a conical pencil of diverging rays from its upper extremity D , to every point of the concave surface of the mirror ACB . But to avoid confusion, we only draw three rays of that pencil, as DA , DC , DB .

From the centre of concavity C , draw the three right lines CA , Cc , CB , touching the mirror in the same points where the foresaid rays touch it; and all these lines will be perpendicular to the surface of the mirror. Make the angle CAd equal to the angle DAC , and draw the right line Ad for the course of the reflected ray DA : make the angle Ccd equal to the angle DcC , and draw the right line cd for the course of the reflected ray Dc : make also the angle CBd equal to the angle DBC , and draw the right line Bd for the course of the reflected ray DB . All these reflected rays will meet in the point d , where they will form the extremity d of the inverted image ed , similar to the extremity D of the upright object DE .

If the pencil of rays Ef , Eg , Eh , be also continued to the mirror, and their angles of reflection from it be made equal to their angles of incidence upon it, as in the former pencil from D , they will all meet at the point e by reflection, and form the extremity e of the image ed , similar to the extremity E of the object DE .

And as each intermediate point of the object, between D and E , sends out a pencil of rays in like manner.

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Aerial images formed by concave mirrors.

manner to every part of the mirror, the rays of each pencil will be reflected back from it, and meet in all the intermediate points between the extremities e and d of the image; and so the whole image will be formed, not at i , half the distance of the mirror from its centre of concavity C ; but at a greater distance, between i and the object DE ; and the image will be inverted with respect to the object.

This being well understood, the reader will easily see how the image is formed by the large concave mirror of the reflecting telescope, when he comes to the description of that instrument.

When the object is more remote from the mirror than its centre of concavity C , the image will be less than the object, and between the object and mirror: when the object is nearer than the centre of concavity, the image will be more remote and bigger than the object. Thus, if DE be the object, ed will be its image: For, as the object recedes from the mirror, the image approaches nearer to it; and as the object approaches nearer to the mirror, the image recedes farther from it; on account of the lesser or greater divergency of the pencils of rays which proceed from the object: for, the less they diverge, the sooner they are converged to points by reflection; and the more they diverge, the farther they must be reflected before they meet.

If the radius of the mirror's concavity, and the distance of the object from it, be known, the distance of the image from the mirror is found by this rule: Divide the product of the distance and radius by double the distance made less by the radius, and the quotient is the distance required.

If the object be in the centre of the mirror's concavity, the image and object will be coincident, and equal in bulk.

If a man places himself directly before a large concave mirror, but farther from it than its centre of concavity, he will see an inverted image of himself in the air, between him and the mirror, of a less size than himself. And if he holds out his hand towards the mirror, the hand of the image will come out towards his hand, and coincide with it, of an equal bulk, when his hand is in the centre of concavity; and he will imagine he may shake hands with his image. If he reaches his hand farther, the hand of the image will pass by his hand, and come between his hand and his body; and if he moves his hand towards either side, the hand of the image will move towards the other; so that whatever way the object moves, the image will move the contrary.

All the while a bystander will see nothing of the image, because none of the reflected rays that form it enter his eyes.

§ 3. Microscopes.

1. *The Single Microscope* is only a very small globe of glass, or a convex lens, whose focal distance is very short. It is represented by cd , fig. 6. The object ab is placed in its focus, and the eye at the same distance on the other side; so that the rays of each pencil, flowing from every point of the object on the side next the glass, may go on parallel to the eye after passing thro' the glass; and then, by entering the eye at C , they will be converged to as many points on the retina, and

form a large inverted picture AB upon it. The magnifying power of this microscope is thus explained by Dr Smith. "A minute object pg , seen distinctly through a small glass AE by the eye put close to it appears so much greater than it would to the naked eye, placed at the least distance qL from whence it appears sufficiently distinct, as this latter distance qL is greater than the former qE . For having put your eye close to the glass EA , in order to see as much of the object as possible at one view, remove the object pg to and fro till it appear most distinctly, suppose at the distance Eg . Then conceiving the glass AE to be removed, and a thin plate, with a pin-hole in it, to be put in its place, the object will appear distinct, and as large as before, when seen through the glass, only so bright. And in this latter case it appears so much greater than it does to the naked eye at the distance qL , either with the pin-hole or without it, as the angle pEq is greater than the angle pLq , or as the latter distance qL is greater than the former qE . Since the interposition of the glass has no other effect than to render the appearance distinct, by helping the eye to increase the refraction of the rays in each pencil, it is plain that the greater apparent magnitude is entirely owing to a nearer view than could be taken by the naked eye. If the eye be so perfect as to see distinctly by pencils of parallel rays falling upon it, the distance Eg , of the object from the glass, is then the focal distance of the glass. Now, if the glass be a small round globe, of about $\frac{1}{7}$ th of an inch diameter, its focal distance Eg , being three quarters of its diameter, is $\frac{3}{4}$ th of an inch; and if qL be eight inches, the distance at which we usually view minute objects, this globe will magnify in the proportion of 8 to $\frac{3}{4}$, or of 160 to 1.

2. *The Double or Compound Microscope* (fig. 7.) consists of an object-glass cd , and an eye-glass ef . The small object ab is placed at a little greater distance from the glass cd than its principal focus; so that the pencils of rays flowing from the different points of the object, and passing through the glass, may be made to converge, and unite in as many points between g and h , where the image of the object will be formed: which image is viewed by the eye through the eye-glass ef . For the eye-glass being so placed, that the image gh may be in its focus, and the eye much about the same distance on the other side, the rays of each pencil will be parallel after going out of the eye-glass, as at e and f , till they come to the eye at i , where they will begin to converge by the refractive power of the humours; and after having crossed each other in the pupil, and passed through the crystalline and vitreous humours, they will be collected into points on the retina, and form the large inverted image AB thereon.

By this combination of lenses, the aberration of the light from the figure of the glass, which in a globe of the kind abovementioned is very considerable, is in some measure corrected. This appeared so sensibly to be the case, even to former opticians, that they very soon began to make the addition of another lens. The instrument, however, receives a considerable improvement by the addition of a third lens. For, says Mr Martin, it is not only evident from the theory of this aberration, that the image of any point is rendered less confused by refraction through two lenses,

than by an equal refraction through one; but it also follows, from the same principle, that the same point has its image still less confused when formed by rays refracted through three lenses, than by an equal refraction through two; and therefore a third lens added to the other two, will contribute to make the image more distinct, and consequently the instrument more complete. At the same time the field of view is amplified, and the use of the microscope rendered more agreeable, by the addition of the other lens. Thus also we may allow a somewhat larger aperture to the object-lens, and thereby increase the brightness of objects, and greatly heighten the pleasure of viewing them. For the same reason, Mr Martin has proposed a four-glass microscope, which answers the purposes of of magnifying and of distinct vision still more perfectly.

Plate
CCXVIII.
fig. 7.

The magnifying power of double microscopes is easily understood, thus: The glass *L* next the object *PQ* is very small, and very much convex, and consequently its focal distance *LF* is very short; the distance *LQ* of the small object *PQ* is but a little greater than *LF*: so that the image *pq* may be formed at a great distance from the glass, and consequently may be much greater than the object itself. This picture *pq* being viewed through a convex glass *AE*, whose focal distance is *qE*, appears distinct as in a telescope. Now the object appears magnified upon two accounts; first, because, if we viewed its picture *pq* with the naked eye, it would appear as much greater than the object, at the same distance, as it really is greater than the object, or as much as *Lq* is greater than *LQ*; and, secondly, because this picture appears magnified through the eye-glass as much as the least distance at which it can be seen distinctly with the naked eye, is greater than *qE*, the focal distance of the eye-glass. For example, if this latter ratio be five to one, and the former ratio of *Lq* to *LQ* be 20 to 1; then, upon both accounts, the object will appear 5 times 20, or 100 times greater than to the naked eye.

Fig. 2. represents a compound microscope with three lenses. By the middle one *GK* the pencils of rays coming from the object-glass are refracted so as to tend to a focus at *O*; but being intercepted by the proper eye-glass *DF*, they are brought together at *I*, which is nearer to that lens than its proper focus at *L*; so that the angle *DIF*, under which the object now appears, is larger than *DLF*, under which it would have appeared without this additional glass; and consequently the object is more magnified in the same proportion. Dr Hooke tells us, that, in most of his observations, he made use of a double microscope with this broad middle-glass when he wanted to see much of an object at one view, and taking it out when he would examine the small parts of an object more accurately; for the fewer refractions there are, the more bright and clear the object appears.

In microscopical lenses whose focal distances are not much shorter than half an inch, there is no need to contract their apertures for procuring distinct vision; the pupil itself being small enough to exclude the exterior straggling rays. But in smaller lenses, where apertures are necessary, Dr Smith has demonstrated, that, to preserve the same degree of distinctness, their

apertures must be as their focal distances, and then the apparent brightness will decrease in a duplicate ratio of their focal distances: so that, by using smaller glasses, the apparent magnitude and the obscurity of the object will both increase in the same ratio. For the ratio of *PD* to *PF* being invariable, the angle Fig. 3. *FPD* is also invariable; and consequently the quantity of light received from the point *F* is also invariable; because the apertures of the lenses, whether smaller or larger, must all be situated at such distances from *F* as just to receive all the rays contained in a cone described by turning the angle *FPD* about the axis *PF*, neither more nor less. But the apparent magnitude of the object, or the surface of its picture upon the retina, is reciprocally as *PF* square; and consequently, the light being the same, its brightness is directly as *PF* square. By this theory it appears, that a minute object cannot be magnified to infinity by a single lens, though it were possible to make it as small as we please, without some method of increasing its light. Nevertheless, this imperfection in single microscopes is not so great as at first sight one would take it to be, or as in fact we find it; the reason may be, because the eye is capable of discerning objects tolerably well by above 20,000 different degrees of light. But though the brightness of the object were increased by throwing new light upon it, yet Huygens observes, that the power of the microscope will still be limited by the breadth of the pencils which enter the pupil; which is equal to the breadth of the aperture. For, if this breadth be less than $\frac{1}{2}$ or $\frac{2}{3}$ of a line, he affirms that the edges of the object will begin to appear indistinct. But by double microscopes this author has made it appear, that we may magnify objects at pleasure, provided it was possible to form their object-glasses sufficiently small.

3. *The Solar Microscope* (fig. 4.), invented by Dr^{plate} Lieberkuhn, is constructed in the following manner. CCXVII. Having procured a very dark room, let a round hole be made in the window-shutter, about three inches diameter, through which the sun may cast a cylinder of rays *AA* into the room. In this hole place the end of a tube containing two convex glasses and an object, viz. 1. A convex glass *aa*, of about two inches diameter, and three inches focal distance, is to be placed in that end of the tube which is put into the hole. 2. The object *bb* being put between two glasses, which must be concave to hold it at liberty, is placed about two inches and a half from the glass *aa*. 3. A little more than a quarter of an inch from the object is placed the small convex glass *cc*, whose focal distance is a quarter of an inch. The tube may be so placed when the sun is low, that his rays *AA* may enter directly into it; but when he is high, his rays *BB* must be reflected into it by the mirror *CC*. Things being thus prepared, the rays that enter the tube will be conveyed by the glass *aa* towards the object *bb*, by which means it will be strongly illuminated, and the rays *dc*, which flow from it through the convex lens *cc*, will make a large inverted picture of the object at *DD*, which, being received on a white paper, will represent the object magnified in length, in the proportion of the distance of the picture from the glass *cc* to the distance of the object from the same glass. Thus, suppose the distance of the object from the glass to be

Of Optical Instruments $\frac{1}{10}$ of an inch, and the distance of the distinct picture to be 12 feet or 144 inches, in which there are 1440 tenth parts of an inch; this number divided by 3 gives 380; which is the number of times that the picture is longer or broader than the object; and the length multiplied by the breadth, shews how many times the whole surface is magnified.

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Mr Martin's method of increasing the light on any object. Plate CCXVIII. fig. 4.
Mr Martin proposes the following method of increasing the light upon objects without heating them too much. Let AB be the frame or plate of the microscope; CD the hole in the middle, into which the tube is screwed on one side, and the illuminating glass is on the other: the size of this illuminator is commonly $\frac{1}{2}$ inch diameter; but that not giving sufficient light, we suppose it removed, and another much larger lens GH placed at the end of the reflector (or looking-glass) EF, moveable upon a foot at F. We may suppose this glass GH to be from three to six inches diameter; and therefore, in our example, let it be a lens of 4 inches diameter, and its focal distance 12 inches.

Then the looking-glass EF being properly adjusted, and the lens GH so poised as to receive the rays of the sun a, b, c , in a perpendicular direction, they will be refracted through it, tending towards a focus in the axis IL at 12 inches from the lens. But this cone of rays falling upon the glass EF, between K and L, will, by it, be reflected to a focus O in the reflected axis LG, which is parallel to the horizon.

Now the focus O of any lens being the image of the sun, will of course be a circle; and in the present case of a lens 12 inches focal distance, this circle will be extremely near $\frac{1}{10}$ of an inch diameter, by allowing $30'$ for the diameter of the sun. Hence the vertex N of the cone will be $\frac{1}{10}$ of an inch beyond the focus O. Therefore the diameter of the section of the cone $\frac{1}{10}$ within the focus, will be $\frac{1}{10}$ of an inch; at $\frac{1}{10}$ within the focus, the section will be $\frac{1}{10}$; at $\frac{1}{10}$ from the focus, the section will be $\frac{1}{10}$; and at $\frac{1}{10}$ from the focus, the section will be $\frac{1}{10}$, or half an inch in diameter.

Therefore at $\frac{1}{10}$ of an inch from the focus the section of the cone will be also $\frac{1}{10}$ of an inch in diameter; and it is found by experience that nearer the focus O no objects can be placed. Therefore the first inch and quarter of the radius cone may be applied for all the various powers of magnifying microscopic objects; and from thence, through the next inch, the megalaoscope may be applied in the greatest perfection.

Let Z be the centre of the hole CD in the frame, then ZO will be about $5\frac{1}{2}$ of the 12 inches, and consequently long enough for a movement of the microscope and megalaoscope through the 2 inches just mentioned. Hence it will appear, that in this construction of the solar microscope, a much less apparatus of tube-work will be necessary than in the common sort, where DOC makes all the cone, and the length Zg is 7 or 8 inches.

If we put the diameter of the common illuminator CD = 1.5, and the diameter of the lens GH = 3, then, in the same section RS of the cone produced by each lens separately, we have the intensity of light as CD² to GH², that is, as 2.25 to 9, or as 1 to 4. If GH = 4, then the ratio of the increase of light will be that of 2.25 to 16, or as 1 to 7.1. Suppose

GH = 5; then 2, 25 : 25 : : 1 : 11 nearly. So that by this construction you may increase the light upon objects, or their images, at least seven times with ease, or ten times with very little trouble or expence.

§ 4. Telescopes.

I. The REFRACTING TELESCOPE.

AFTER what has been said concerning the structure of the compound microscope, and the manner in which the rays pass through it to the eye, the nature of the common astronomical telescope will easily be understood: for it differs from the microscope only in that the object is placed at so great a distance from it, that the rays of the same pencil, flowing from thence, may be considered as falling parallel to one another upon the object-glass; and therefore the image made by that glass is looked upon as coincident with its focus of parallel rays.

1. The 6th figure will render this very plain; in Plate which AB is the object emitting the several pencils CCXVII. of rays $A d c, B c d$, &c. but supposed to be at so great a distance from the object-glass $e d$, that the rays of the same pencil may be considered as parallel to each other; they are therefore supposed to be collected into their respective foci at the point m and p , situated at the focal distance of the object-glass $c d$. Here they form an image E , and crossing each other proceed diverging to the eye-glass $h g$; which being placed at its own focal distance from the points m and p , the rays of each pencil, after passing through that glass, will become parallel among themselves; but the pencils themselves will converge considerably with respect to one another, even so as to cross at e , very little farther from the glass $g h$ than its focus; because, when they entered the glass, their axes were almost parallel, as coming through the object-glass at the point k , to whose distance the breadth of the eye-glass in a long telescope bears very small proportion. So that the place of the eye will be nearly at the focal distance of the eye-glass, and the rays of each respective pencil being parallel among themselves, and their axes crossing each other in a larger angle than they would do if the object were to be seen by the naked eye, vision will be distinct, and the object will appear magnified.

The power of magnifying in this telescope is as the focal length of the object-glass to the focal length of the eye-glass.

DEM. In order to prove this, we may consider the angle $A k B$ as that under which the object would be seen by the naked eye; for in considering the distance of the object, the length of the telescope may be omitted, as bearing no proportion to it. Now the angle under which the object is seen by means of the telescope, is $g e h$, which is to the other $A k B$, or its equal $g k h$, as the distance from the centre of the object-glass to that of the eye-glass. The angle, therefore, under which an object appears to an eye assisted by a telescope of this kind, is to that under which it would be seen without it, as the focal length of the object-glass to the focal length of the eye-glass.

It is evident from the figure, that the visible area, or space which can be seen at one view when we look through this telescope, depends on the breadth of the eye-glass, and not of the object-glass; for if the eye-glass be too small to receive the rays $g m, p h$, the extremities

tremities of the object could not have been seen at all: a larger breadth of the object-glass conduces only to the rendering each point of the image more luminous by receiving a larger pencil of rays from each point of the object.

It is in this telescope as in the compound microscope, where we see, when we look through it, not the object itself, but only an image of it at CED: now that image being inverted with respect to the object, as it is, because the axes of the pencils that flow from the object cross each other at k , objects seen through a telescope of this kind necessarily appear inverted.

This is a circumstance not at all regarded by astronomers: but for viewing objects upon the earth, it is convenient that the telescope should represent them in their natural posture; to which use the telescope with three eye-glasses, as represented fig. 7. is peculiarly adapted, and the progress of the rays through it from the object to the eye is as follows:

AB is the object sending out the several pencils Acd , Bcd , &c. which passing through the object-glass cd , are collected into their respective foci in CD, where they form an inverted image. From hence they proceed to the first eye-glass ef , whose focus being at l , the rays of each pencil are rendered parallel among themselves, and their axes, which were nearly parallel before, are made to converge and cross each other: the second eye-glass gh , being so placed that its focus shall fall upon m , renders the axis of the pencils which diverge from thence parallel, and causes the rays of each which were parallel among themselves to meet again at its focus EF on the other side, where they form a second image inverted with respect to the former, but erect with respect to the object. Now this image being seen by the eye at ab through the eye-glass ik , affords a direct representation of the object, and under the same angle that the first image CD would have appeared, had the eye been placed at l , supposing the eye-glasses to be of equal convexity; and therefore the object is seen equally magnified in this as in the former telescope, that is, as the focal distance of the object-glass to that of any one of the eye-glasses, and appears erect.

If a telescope exceeds 20 feet, it is of no use in viewing objects upon the surface of the earth; for if it magnifies above 90 or 100 times, as those of that length usually do, the vapours, which continually float near the earth in great plenty, will be so magnified as to render vision obscure.

2. The Galilean Telescope with the concave eye-glass is constructed as follows:

AB (fig. 5.) is an object sending forth the pencils of rays $gh i$, $k l m$, &c. which, after passing through the object-glass cd , tend towards $e f'$ (where we will suppose the focus of it to be), in order to form an inverted image there as before; but in their way to it are made to pass through the concave glass no , so pla-

ced that its focus may fall upon E, and [consequently] the rays of the several pencils which were converging towards those respective focal points e , E , f' , will be rendered parallel among themselves; but the axes of those pencils crossing each other at F, and diverging from thence, will be rendered more diverging, as represented in the figure. Now these rays entering the pupil of an eye, will form a large and distinct image ab upon the retina, which will be inverted with respect to the object, because the axes of the pencils cross in F; and the angle the object will appear under will be equal to that which the lines $a F$, $b F$, produced back through the eye-glass, form at F.

It is evident, that the less the pupil of the eye is, the less is the visible area seen through a telescope of this kind; for a less pupil would exclude such pencils as proceed from the extremities of the object AB, as is evident from the figure. This is an inconvenience that renders this telescope unfit for many uses; and is only to be remedied by the telescope with the convex eye-glasses, where the rays which form the extreme parts of the image are brought together in order to enter the pupil of the eye, as explained above.

It is apparent also, that the nearer the eye is placed to the eye-glass of this telescope, the larger is the area seen through it; for, being placed close to the glass, as in the figure, it admits rays that come from A and B, the extremities of the object, which it could not if it was placed farther off.

The degree of magnifying in this telescope is in the same proportion with that in the other, viz. as the focal distance of the object-glass is to the focal distance of the eye-glass.

For there is no other difference but this, viz. that as the extreme pencils in that telescope were made to converge and form the angle geb (fig. 6.), or ink (fig. 7.), these are now made to diverge and form the angle $a F b$ (fig. 5.); which angles, if the concave glass in one has an equal refractive power with the convex one in the other, will be equal, and therefore each kind will exhibit the object magnified in the same degree.

There is a defect in all these kinds of telescopes, not to be remedied in a single lens by any means whatever, which was* thought only to arise from hence, viz. that spherical glasses do not collect rays to one and the same point. But it was happily discovered by Sir Isaac Newton, that the imperfection of this sort of telescope, so far as it arises from the spherical form of the glasses, bears almost no proportion to that which is owing to the different refrangibility of light. This diversity in the refraction of rays is about a 28th part of the whole; so that the object-glass of a telescope cannot collect the rays which flow from any one point in the object into a less room than the circular space whose diameter is about the 56th part of the breadth of the glass (A). Therefore, since each

(A) To shew this, let AB, fig. 7. represent a convex lens, and let CDF be a pencil of rays flowing from the point D: let H be the point at which the least refrangible rays are collected to a focus; and I, that where the most refrangible concur. Then, if IH be the 28th part of EH, IK will be a proportionable part of EC (the triangles HIK and HEC being similar): consequently LK will be the 28th part of FC. But MN will be the least space in- to which the rays will be collected, as appears by their progress represented in the figure. Now MN is but about half of KL; and therefore it is about the 56th part of CF: so that the diameter of the space, into which the rays are collected, will be about the 56th part of the breadth of that part of the glass thro' which the rays pass. Which was to be shewn.

each point of the object will be represented in so large a space, and the centres of those spaces will be contiguous, because the points in the object the rays flow from are so; it is evident, that the image of an object made by such a glass must be a most confused representation, though it does not appear so when viewed through an eye-glass that magnifies in a moderate degree; consequently the degree of magnifying in the eye-glass must not be too great with respect to that of the object-glass, lest the confusion become sensible.

Notwithstanding this imperfection, a dioptrical telescope may be made to magnify in any given degree, provided it be of sufficient length; for the greater the focal distance of the object-glass is, the less may be the proportion which the focal distance of the eye-glass may bear to that of the object-glass, without rendering the image obscure. Thus, an object-glass, whose focal distance is about four feet, will admit of an eye-glass whose focal distance shall be little more than an inch, and consequently will magnify almost 48 times: but an object-glass of 40 foot focus will admit of an eye-glass of only four-inch focus, and will therefore magnify 120 times; and an object-glass of 100 foot focus will admit of an eye-glass of little more than six-inch focus, and will therefore magnify almost 200 times.

The reason of this disproportion in their several degrees of magnifying is to be explained in the following manner. Since the diameter of the spaces, into which rays flowing from the several points of an object are collected, are as the breadth of the object-glass, it is evident that the degree of confusedness in the image is as the breadth of that glass; for the degree of confusedness will only be as the diameters or breadths of those spaces, and not as the spaces themselves. Now the focal length of the eye-glass, that is, its power of magnifying, must be as that degree; for, if it exceeds it, it will render the confusedness sensible; and therefore it must be as the breadth or diameter of the object-glass. The diameter of the object-glass, which is as the square root of its aperture or magnitude, must be as the square-root of the power of magnifying in the telescope; for unless the aperture itself be as the power of magnifying, the image will want light: the square root of the power of magnifying will be as the square root of the focal distance of the object-glass; and therefore the focal distance of the eye-glass must be only as the square root of that of the object-glass. So that in making use of an object-glass of a longer focus, suppose, than one that is given, you are not obliged to apply an eye-glass of a proportionably longer focus than what would suit the given object-glass, but such an one only whose focal distance shall be to the focal distance of that which will suit the given object-glass, as the square root of the focal length of the object-glass you make use of, is to the square root of the focal length of the given one. And this is the reason that longer telescopes are capable of magnifying in a greater degree than shorter ones, without rendering the object confused or coloured.

3. *Dollond's Telescopes.*—The general principle on which this artist's celebrated improvement of the refracting telescope depends, hath been already mentioned;

namely, that by the different powers of refraction in two kinds of glass, and by their different powers of dispersing the rays, the errors arising from the different refrangibility of the light are in a great measure, if not totally, corrected.—For this purpose the object-glasses of his telescopes are composed of three distinct lenses, one convex and one concave; of which the concave one is placed in the middle, as is represented in fig. 6. where *a* and *c* shew the two convex lenses, and *b* the concave one, which is by the British artists placed in the middle. The two convex ones are made of green glass, and the middle one of white flint glass, and are all ground to spheres of the same radius. When put together, they refract the rays in the following manner.

Let *ab*, *ab*, be two red rays of the sun's light falling parallel on the first green convex lens *c*. Supposing there was no other lens present but that one, they would then be converged into the lines *be*, *be*, and at last meet in the focus *g*. Let the lines *gh*, *gh*, represent two violet rays falling on the surface of the lens. These are also refracted, and will meet in a focus; but as they have a greater degree of refrangibility than the red rays, they must, of consequence, converge more by the same power of refraction in the glass, and meet sooner in a focus, suppose at *r*.—Let now the concave lens *d* be placed in such a manner as to intercept all the rays before they come to their focus. As this lens is ground to the same radius with the convex one, it must have the same power to cause the rays diverge that the former had to make them converge; that is, supposing them both to be made of the same materials. In this case, the red rays would become parallel, and move on in the line *oo*, *oo*. But the concave lens, being made of white glass, has a greater refractive power, and therefore they diverge a little after they come out of it; and if no third lens was interposed, they would proceed diverging in the lines *opt*, *opt*; but, by the interposition of the third lens *ooo*, they are again made to converge, and meet in a focus somewhat more distant than the former, as at *x*. By the concave lens the violet rays are also refracted, and made to diverge: but having a greater degree of refrangibility, the same power of refraction makes them diverge somewhat more than the red ones; and thus, if no third lens was interposed, they would proceed in such lines as *lmn*, *lmn*. Now as the differently coloured rays fall upon the third lens with different degrees of divergence, it is plain, that the same power of refraction in that lens will operate upon them in such a manner as to bring them all together to a focus very nearly at the same point. The red rays, it is true, require the greatest power of refraction to bring them to a focus; but they fall upon the lens with the least degree of divergence. The violet rays, though they require the least power of refraction, yet have the greatest degree of divergence; and thus all meet together at the point *x*, or very nearly so.

But, though we have hitherto supposed the refraction of the concave lens to be greater than that of the convex ones, it is easy to see how the errors occasioned by the first lens may be corrected by it, though it should have even a less power of refraction than the convex one. Thus, let *a*, *b*, *a*, *b*, fig. 8, be two rays of red light falling upon the convex lens *c*, and refracted into the focus *g*; let also *g*, *h*, *g*, *h*, be two violet rays

Plate CCXVI.

Fig. 7.

can-

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How remedied by Mr. Dollond.

converged into a focus at r ; it is not necessary, in order to their convergence into a common focus at x , that the concave lens should make them *diverge*: it is sufficient if the glass has a power of dispersing the violet rays somewhat more than the red ones; and many kinds of glass have this power of dispersing some kinds of rays, without a very great power of refraction. It is better, however, to have the object-glasses composed of three lenses; because there is then another correction of the aberration by means of the third lens; and it might be impossible to find two lenses, the errors of which would exactly correct each other. It is also easy to see, that the effect may be the same whether the concave glass is a portion of the same sphere with the others or not; the effect depending upon a combination of certain circumstances, of which there is an infinite variety.

By means of this correction of the errors arising from the different refrangibility of the rays of light, it is possible to shorten dioptric telescopes considerably, and yet leave them equal magnifying powers. The reason of this is, that the errors arising from the object-glasses being removed, those which are occasioned by the eye-glasses are inconceivable: for the error is always in proportion to the length of the focus in any glass; and in very long telescopes it becomes exceedingly great, being no less than $\frac{1}{3}$ of the whole; but in glasses of a few inches focus it becomes trifling. Refracting telescopes which go by the name of *Dollond's*, are therefore now constructed in the following manner. Let AB (fig. 1.) represent an object-glass composed of three lenses as above described, and converging the rays 1, 2, 3, 4, &c. to a very distant focus as at x . By means of the interposed lens CD, however, they are converged to one much nearer, as at y , where an image of the object is formed. The rays diverging from thence fall upon another lens EF, where the pencils are rendered parallel, and an eye placed near that lens would see the object magnified and very distinct. To enlarge the magnifying power still more, however, the pencils thus become parallel are made to fall upon another at GH; by which they are again made to converge to a distant focus: but, being intercepted by the lens IK, they are made to meet at the nearer one z ; whence diverging to LM, they are again rendered parallel, and the eye at N sees the object very distinctly.

From an inspection of the figure it is evident, that Dollond's telescope thus constructed is in fact two telescopes combined together; the first ending with the lens EF, and the second with LM. In the first we do not perceive the object itself, but the image of it formed at y ; and in the second we perceive only the image of that image formed at z . Nevertheless such telescopes are exceedingly distinct, and represent objects so clearly as to be preferred, in viewing terrestrial things, even to reflectors themselves. The latter indeed have greatly the advantage in their powers of magnifying, but they are much deficient in point of light. Much more light is lost by reflection than by refraction: and as in these telescopes the light must unavoidably suffer two reflections, a great deal of it is lost; nor is this loss counterbalanced by the greater aperture which these telescopes will bear, which enables them to receive a greater quantity of light

than the reflecting ones. The metals of reflecting telescopes also are very much subject to tarnish, and require much more dexterity to clean them than the glasses of refractors; which makes them more troublesome and expensive, though for making discoveries in the celestial regions they are undoubtedly the only proper instruments.

II. The REFLECTING TELESCOPE.

1. *Of Sir Isaac Newton's Reflecting Telescope.* The inconveniences arising from the great length of refracting telescopes are sufficiently obvious; and these, together with the difficulties arising from the different refrangibility of light, induced Sir Isaac Newton to give attention to the subject of reflection, and endeavour to realize the ideas of himself and others concerning the possibility of constructing telescopes upon this principle. The instrument he contrived is represented fig. 9. where ABCD is the tube, BC a concave reflecting metal, EF a plain reflecting metal fixed to the tube by means of the stem HL. MN represents a distant object emitting pencils of rays from each point, two only of which are here represented, and those cut off before they reach the metal, to prevent confusion in the figure. Now it is evident from what has been explained above, that these rays, were they not intercepted in their way, would return after reflection at the concave surface BC, and form an inverted image at OP, supposing that to be the place of the focus of reflected rays. But in this case the reflected rays are intercepted in their return to that place by the plain metal, and are thereby thrown sidewise; and instead of forming the image OP, are made to form the image QR: which, because the rays have as yet suffered no refraction, is not liable to the imperfection which arises from the different refrangibility of the rays of light, nor to any other except what may arise from an imperfect polish, or the want of the form of one of the conic sections in the reflector BC; and therefore may be viewed by an eye at T with a very small lens or eye-glass KL, without appearing either coloured or confused.

2. *The Gregorian telescope.* This remedies the inconvenience of the Newtonian one, by which objects are found with difficulty. This defect, indeed, was in some measure removed by having a small refracting telescope with two hairs, or wires, running thro' the tube in the common focus of the two glasses, and crossing each other at right angles; and the object being first viewed through this small telescope was afterwards easily found by the reflector. But the inconvenience is more effectually remedied by the following construction.

At the bottom of the great tube TTTT (fig. 8.) is placed the large concave mirror DUVF, whose principal focus is at m ; and in its middle is a round hole P, opposite to which is placed the small mirror L, concave toward the great one; and so fixed to a strong wire M, that it may be moved farther from the great mirror, or nearer to it, by means of a long screw on the outside of the tube, keeping its axis still in the same line Pmn with that of the great one. Now, since in viewing a very remote object, we can scarce see a point of it but what is at least as broad as the great mirror, we may consider the rays of each pencil, which

flow from every point of the object, to be parallel to each other, and to cover the whole reflecting surface DUVF. But to avoid confusion in the figure, we shall only draw two rays of a pencil flowing from each extremity of the object into the great tube, and trace their progress, through all their reflections and refractions, to the eye f , at the end of the small tube tt , which is joined to the great one.

Let us then suppose the object AB to be at such a distance, that the rays C may flow from its lower extremity B, and the rays E from its upper extremity A. Then the rays C falling parallel upon the great mirror at D, will be thence reflected converging, in the direction DG; and by crossing at I, in the principal focus of the mirror, they will form the upper extremity I of the inverted image IK, similar to the lower extremity B of the object AB: and passing on to the concave mirror L (whose focus is at n) they will fall upon it at g , and be thence reflected converging, in the direction gN , because gm is longer than gn ; and passing through the hole P in the large mirror, they would meet somewhere about r , and form the lower extremity D of the erect image ad , similar to the lower extremity B of the object AB. But by passing through the plano-convex glass R in their way, they form that extremity of the image at b . In like manner, the rays E, which come from the top of the object AB, and fall parallel upon the great mirror at F, are thence reflected converging to its focus, where they form the lower extremity K of the inverted image IK, similar to the upper extremity A of the object AB; and thence passing on to the small mirror L, and falling upon it at h , they are thence reflected in the converging state hO ; and going on through the hole P of the great mirror, they would meet somewhere about q , and form there the upper extremity a of the erect image ad , similar to the upper extremity A of the object AB: but by passing through the convex glass R in their way, they meet and cross sooner, as at a , where the point of the erect image is formed. The like being understood of all those rays which flow from the intermediate points of the object between A and B, and enter the tube TT, all the intermediate points of the image between a and b will be formed; and the rays passing on from the image, through the eye-glass S, and through a small hole e in the end of the lesser tube tt , they enter the eye f (which sees the image ab by means of the eye-glass) under the large angle ced , and magnified in length under that angle from c to d .

In the best reflecting telescopes, the focus of the small mirror is never coincident with the focus n of the great one, where the first image IK is formed, but a little beyond it (with respect to the eye), as at n : the consequence of which is, that the rays of the pencils will not be parallel after reflection from the small mirror, but converge so as to meet in points about q, e, r ; where they would form a larger upright image than ab , if the glass R was not in their way; and this image might be viewed by means of a single eye-glass properly placed between the image and the eye: but then the field of view would be less, and consequently not so pleasant; for which reason, the glass R is still retained, to enlarge the scope or area of the field.

To find the magnifying power of this telescope, multiply the focal distance of the great mirror by the distance of the small mirror from the image next the eye, and multiply the focal distance of the small mirror by the focal distance of the eye-glass; then divide the product of the former multiplication by the product of the latter, and the quotient will express the magnifying power.

One great advantage of the reflecting telescope is, that it will admit of an eye-glass of a much shorter focal distance than a refracting telescope will; and, consequently, it will magnify so much the more: for the rays are not coloured by reflection from a concave mirror, if it be ground to a true figure, as they are by passing through a convex-glass, let it be ground ever so true.

The adjusting screw on the outside of the great tube fits this telescope to all sorts of eyes, by bringing the small mirror either nearer to the eye, or removing it farther; by which means the rays are made to diverge a little for short-sighted eyes, or to converge for those of a long sight.

The nearer an object is to the telescope, the more its pencils of rays will diverge before they fall upon the great mirror, and therefore they will be the longer of meeting in points after reflection; so that the first image IK will be formed at a greater distance from the large mirror, when the object is near the telescope, than when it is very remote. But as this image must be formed farther from the small mirror than its principal focus n , this mirror must be always set at a greater distance from the large one, in viewing near objects, than in viewing remote ones. And this is done by turning the screw on the outside of the tube, until the small mirror be so adjusted, that the object (or rather its image) appears perfect.

In looking through any telescope towards an object, we never see the object itself, but only that image of it which is formed next the eye in the telescope. For if a man holds his finger or a stick between his bare eye and an object, it will hide part (if not the whole) of the object from his view. But if he ties a stick across the mouth of a telescope before the object-glass, it will hide no part of the imaginary object he saw through the telescope before, unless it covers the whole mouth of the tube: for all the effect will be, to make the object appear dimmer, because it intercepts part of the rays. Whereas, if he puts only a piece of wire across the inside of the tube, between the eye-glass and his eye, it will hide part of the object which he thinks he sees: which proves, that he sees not the real object, but its image. This is also confirmed by means of the small mirror L, in the reflecting telescope, which is made of opaque metal, and stands directly between the eye and the object towards which the telescope is turned; and will hide the whole object from the eye at e , if the two glasses R and S are taken out of the tube.

§ 5. Camera Obscura.

THE camera obscura is made by a convex-glass CD (fig. 2.) placed in a hole of a window-shutter. plate. Then if the room be darkened, so as no light can enter but what comes thro' the glass, the pictures of all the objects (as fields, trees, buildings, men, cattle,

cattle, &c.) on the outside, will be shewn in an inverted order, on a white paper placed at GH in the focus of the glass; and will afford a most beautiful and perfect piece of perspective or landscape of whatever is before the glass, especially if the sun shines upon the objects.

If the convex-glass CD be placed in a tube in the side of a square box, within which is the plane mirror EF, reclining backwards in an angle of 45 degrees from the perpendicular kg , the pencils of rays flowing from the outward objects, and passing thro' the convex glass to the plane mirror, will be reflected upwards from it, and meet in points, as I and K (at the same distance that they would have met at H and G, if the mirror had not been in the way,) and will form the aforesaid images on an oiled paper stretched horizontally in the direction IK: on which paper the outlines of the images may be easily drawn with a black-lead pencil; and then copied on a clean sheet, and coloured by art, as the objects themselves are by nature.—In this machine, it is usual to place a plane glass, unpolished, in the horizontal situation IK, which glass receives the images of the outward objects; and their outlines may be traced upon it by a black-lead pencil.

N. B. The tube in which the convex-glass CD is fixed, must be made to draw out, or push in, so as to adjust the distance of that glass from the plane mirror, in proportion to the distance of the outward objects; which the operator does, until he sees their images distinctly painted on the horizontal glass at IK.

The forming a horizontal image, as IK, of an upright object AB, depends upon the angles of incidence of the rays upon the plane mirror EF, being equal to their angles of reflection from it. For, if a perpendicular be supposed to be drawn to the surface of the plane mirror at e , where the ray Aac falls upon it, that ray will be reflected upwards in an equal angle with the other side of the perpendicular, in the line edI . Again, if a perpendicular be drawn to the mirror from the point f , where the ray Abf falls upon it, that ray will be reflected in an equal angle from the other side of the perpendicular, in the line fbI . And if a perpendicular be drawn from the point g , where the ray Acg falls upon the mirror, that ray will be reflected in an equal angle from the other side of the perpendicular, in the line giI . So that all the rays of the pencil abc , flowing from the upper extremity of the object AB, and passing thro' the convex glass CD, to the plane mirror EF, will be reflected from the mirror, and meet at I, where they will form the extremity I of the image IK, similar to the extremity A of the object AB. The like is to be understood of the pencil grs , flowing from the lower extremity of the object AB, and meeting at K (after reflection from the plane mirror) the rays from the extremity K of the image, similar to the extremity B of the object: and so of all the pencils that flow from the intermediate points of the object to the mirror, thro' the convex glass.

If a convex glass, of a short focal distance, be placed near the plane mirror in the end of a short tube, and a convex glass be placed in a hole in the side of the

tube, so as the image may be formed between the last-mentioned convex glass and the plane mirror; the image being viewed thro' this glass, will appear magnified.—In this manner, the *Opera-glasses* are constructed; with which a gentleman may look at any lady at a distance in the company, and the lady know nothing of it.

§ 6. Magic Lantern.

ABCD (fig. 5.) is a tin lantern, with a tube $nklm$ fixed in the side of it. This tube consists of two joints, one of which slips into the other: and by drawing this joint out, or pushing it in, the tube may be made longer or shorter. At kl , in the end of the moveable joint of the tube, a convex lens is fixed; and an object painted with transparent colours upon a piece of thin glass is placed at de , somewhere in the immovable joint of the tube; so that as the tube is lengthened or shortened, the lens will be either at a greater or a less distance from this transparent object. In the side of the lantern there is a very convex lens bhc , which serves to cast a very strong light from the candle within the lantern upon the object de . Now when the rays, which shine through the object de , diverge from the several points as d, e , &c. in the object, and fall upon the lens kl , they will be made to converge to as many points f, g , &c. on the other side of the lens, and will paint an inverted picture of the object at fg upon a white wall, a sheet, or a screen of white paper, provided the object is farther from the lens than its principal focus. To make this picture appear distinct and bright, it must have no other light fall upon it but what comes through the lens kl ; and for this reason the whole apparatus is to be placed in a dark room EFGH. The lens kl must be very convex, so that the object de may be very near to it, and yet not be nearer than its principal focus: for by this means, as the object is near to the lens, the picture fg will be at a great distance from it, and consequently the picture will be much bigger than the object. Since the picture is inverted in respect of the object, in order to make the picture appear with the right end upwards, it is necessary that the object de should be placed with the wrong end upwards.

SECT. V. *A Description of the above and other Optical Instruments, fitted with their Apparatus; with an account of the methods of applying them to the purposes for which they are intended.*

§ 1. Camera Obscura and Magic Lantern.

See DIOPTRICS, p. 2477 to p. 2482.

§ 2. The Graphical Perspective.

This instrument consists of two lenses AB and CD, fig. 1. which are placed at twice their focal distance Plate from one another; and in their common focus is another glass EF, divided into equal parts with the point of a diamond. Though this instrument does not magnify objects, yet the angle under which any object is seen is easily known by it; and since this angle varies with the distance of objects, it is easily applied to the purpose of measuring inaccessible heights and distances;

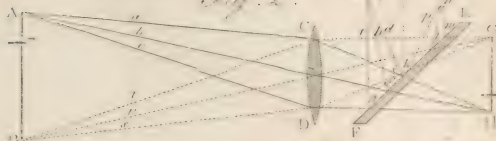
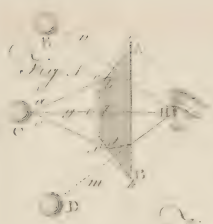


Fig. 3.



Fig. 5.

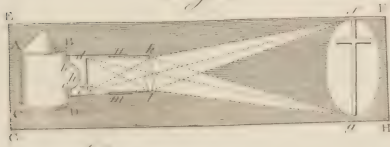


Fig. 4.

Fig. 6.

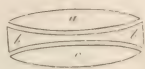


Fig. 9.

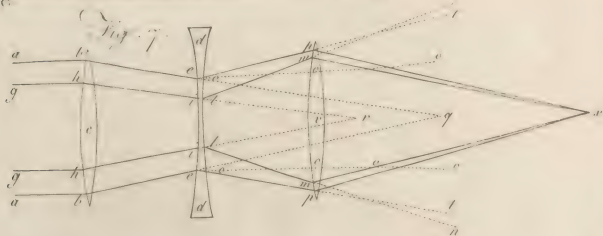


Fig. 7.

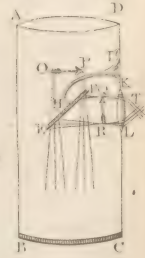
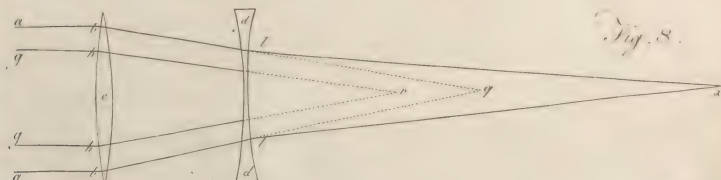


Fig. 8.





OPTICS. *Fig. 2.*

PLATE CCXXV

Fig. 1.



Fig. 4.



Fig. 3.

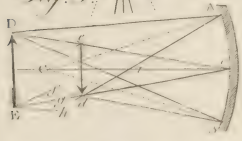


Fig. 5.

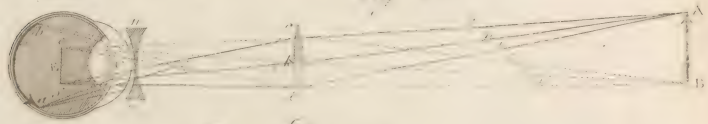


Fig. 6.

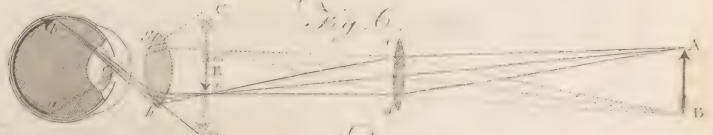
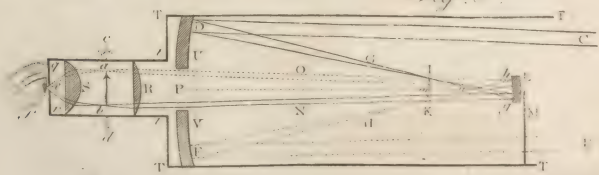


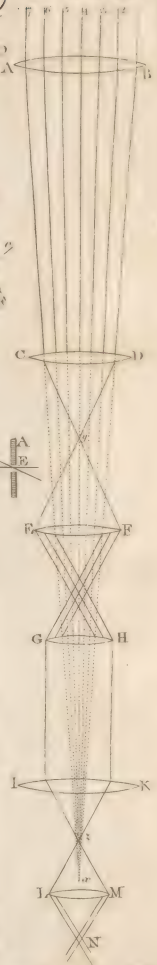
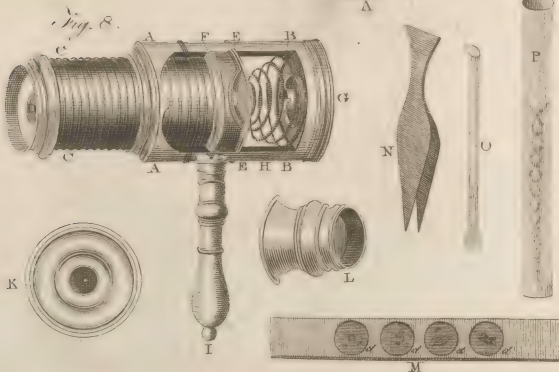
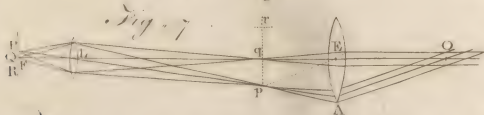
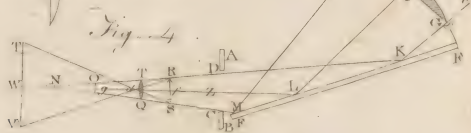
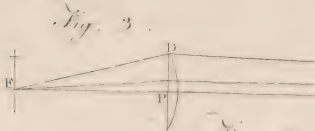
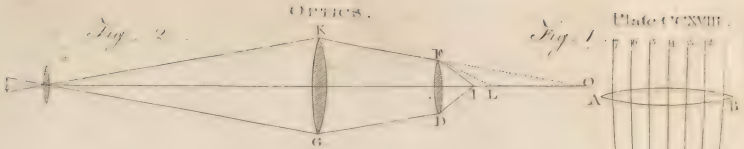
Fig. 7.



Fig. 8.









distances; and since the field of view is divided into equal squares, it is useful in drawing the perspective appearance of objects. As all foreign light is excluded by the tube in which these lenses are inclosed, pictures seen through this machine have a fine relief; on which account, as also because objects appear inverted through it, the images of a camera obscura are viewed to particular advantage by its means. If a lens of a greater focal length be fixed at a proper distance from the centre of the tube, this instrument will be a telescope, and will magnify the prints which are looked at through it; and if a small lens be used, it will be a microscope; and the same micrometer will serve for both.

§ 3. Of the Single Microscope.

THE famous microscopes made use of by Mr Leuwenhoek, were all, as Mr Baker assures us, of the single kind, and the construction of them the most simple possible, each consisting only of a single lens set between two plates of silver, perforated with a small hole, with a moveable pin before it to place the object on, and adjust it to the eye of the beholder. He informs us also, that *lenses* only, and not *globules*, were used in every one of these microscopes.

The single microscope now most generally known and used is that called *Wilson's Pocket Microscope*. The body is made of brass, ivory, or silver, and is represented by AA, BB. CC is a long fine-threaded male-screw that turns into the body of the microscope. D a convex glass at the end of the screw. *, Two concave round pieces of thin brass, with holes of different diameters in the middle of them, to cover the above-mentioned glass, and thereby diminish the aperture when the greatest magnifiers are employed. EE, three thin plates of brass within the body of the microscope; one of which is bent semicircularly in the middle, so as to form an arched cavity for the reception of a tube of glass, the use of the other two being to receive and hold the sliders between them. F, a piece of wood or ivory, arched in the manner of the semicircular plate, and cemented thereto. G, the other end of the body of the microscope, where a hollow female screw is adapted to receive the different magnifiers. H, is a spiral spring of steel, between the end G and the plates of brass, intended to keep the plates in a right position, and counteract the long screw CC. I, is a small turned handle, for the better holding of the instrument, to screw on or off at pleasure.

To this microscope belong six or seven magnifying glasses: six of them are set in silver, brass, or ivory, as in the figure K, and marked 1, 2, 3, 4, 5, 6; the lowest numbers being the greatest magnifiers. L, is the seventh magnifier, set in the manner of a little barrel, to be held in the hand for the viewing of any larger object. M, is a flat slip of ivory, called a *slider*, with four round holes thro' it, wherein to place objects between two pieces of glass, or Mulcovy talc, as they appear d d d. Eight such sliders, and one of brass, are usually fold with this microscope; some with objects placed in them, and others empty for viewing any thing that may offer: but whoever pleases to make a collection, may have as many as he desires. The brass slider is to confine any small ob-

ject, that it may be viewed without crushing or destroying it.

N, is a forceps, or pair of piers, for the taking up of insects or other objects, and adjusting them to the glasses. O, is a little hair-brush or pencil, wherewith to wipe any dust from off the glasses, or to take up any small drop of liquid, which one would want to examine, and put it upon the talcs, or isinglass. P is a tube of glass contrived to confine living objects, such as frogs, fishes, &c. in order to discover the circulation of the blood. All these are contained in a little neat box, very convenient for carrying in the pocket.

When an object is to be viewed, thrust the ivory slider, in which the said object is placed, between the two flat brass plates EE: observing always to put that side of the slider where the brass rings are, farthest from the eye. Then screw on the magnifying glass you intend to use, at the end of the instrument G; and looking thro' it against the light, turn the long screw CC, till your object be brought to fit your eye; which will be known by its appearing perfectly distinct and clear. It is most proper to look at it first through a magnifier that can shew the whole at once, and afterwards to inspect the several parts more particularly with one of the greatest magnifiers; for thus you will gain a true idea of the whole, and of all its parts. And tho' the greatest magnifiers can shew but a minute portion of any object at once, such as the claw of a flea, the horn of a louse, or the like, yet by gently moving the slider which contains the object, the eye will gradually overlook it all.

As objects must be brought very near the glasses when the greatest magnifiers are made use of, be careful not to scratch them by rubbing the slider against them as you move it in or out. A few turns of the screw CC will easily prevent this mischief, by giving them room enough. You may change the objects in your sliders for what others you think proper, by taking out the brass rings with the point of a pen-knife; the isinglass will then fall out, if you but turn the sliders; and after putting what you please between them, by replacing the brass rings you will fasten them as they were before. It is proper to have some sliders furnished with talcs, but without any object between them, to be always in readiness for the examination of fluids, salts, sands, powders, the farina of flowers, or any other casual objects of such sort as need only be applied to the outside of the talc.

The circulation of the blood may be easiest seen in the tails or fins of fishes, in the fine membranes between a frog's toes, or best of all in the tail of a water-newt. If your object be a small fish, place it within the tube, and spread its tail or fin along the side thereof: if a frog, choose such an one as can but just be got into your tube; and, with a pen, or small stick, expand the transparent membrane between the toes of the frog's hind foot as much as you can. When your object is so adjusted, that no part of it can intercept the light from the place you intend to view, unscrew the long screw CC, and thrust your tube into the arched cavity, quite thro' the body of the microscope; then screw it to the true focal distance, and you will see the blood passing along its vessels with a rapid motion, and in a most surprising manner.

The third or fourth magnifiers may be used for frogs or fishes: but for the tails of water-newts, the fifth or sixth will do; because the globules of their blood are twice as large as those of frogs or fish. The first or second magnifier cannot well be employed for this purpose; because the thickness of the tube in which the object lies, will scarce admit its being brought so near as the focal distance of the magnifier.

§ 5. *The Single Microscope with Reflection.*

Plate
CCCLX.

In fig. 2. A is a scroll of brass fixed upright on a round pedestal of wood B, so as to stand perfectly firm and steady. C is a brass screw, that passes thro' a hole in the upper limb of the scroll, into the side of the microscope D, and screws it fast to the said scroll. E, is a concave speculum set in a box of brass, which hangs in the arch G by two small screws *ff*; that screw into the opposite sides thereof. At the bottom of this arch is a pin of the same metal, exactly fitted to a hole *h* in the wooden pedestal, made for the reception of the pin. As the arch turns on this pin, and the speculum turns on the ends of the arch, it may, by this twofold motion, be easily adjusted in such a manner as to reflect the light of the sun, of the sky, or of a candle, directly upwards through the microscope that is fixed perpendicularly over it; and by so doing, may be made to answer almost all the purposes of the large double reflecting microscope. The body of the microscope may also be fixed horizontally, and objects viewed in that position by any light you choose, which is an advantage the double reflecting microscope has not. It may also be rendered further useful by means of a slip of glass, one end of which being thrust thro' between the plates where the sliders go, and the other extending to some distance, such objects may be placed thereon as cannot be applied in the sliders: and then, having a limb of brass that may fasten to the body of the microscope, and extend over the projecting glass a hollow ring wherein to screw the magnifiers, all sorts of subjects may be examined with great convenience, if a hole be made in the pedestal, to place the speculum exactly underneath, and thereby throw up the rays of light.

The pocket-microscope, thus mounted, says Mr Baker, "is as easy and pleasant in its use; as fit for the most curious examination of the animalcules and salts in fluids, of the farins in vegetables, and of the circulation in small animals; in short, is as likely to make considerable discoveries in objects that have some degree of transparency, as any microscope I have ever seen or heard of."

§ 5. *Of the Double Refracting and Reflecting Microscopes.*

DOUBLE microscopes are so called as being a combination of two or more lenses.

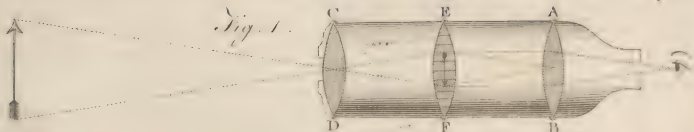
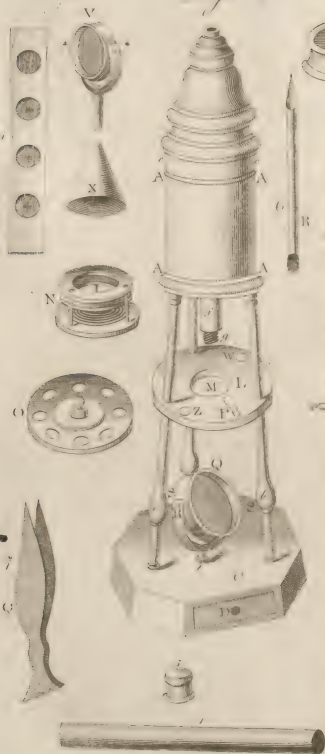
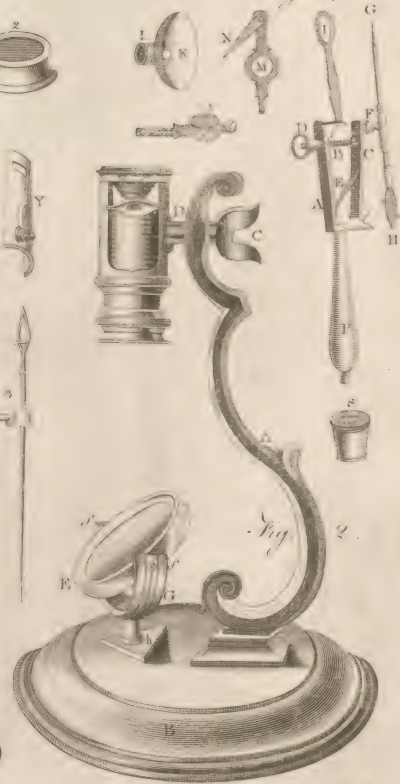
The only advantage which the double *refracting* microscope hath over the single one is, that it takes in a larger field of view; and therefore hath yielded to the double *reflecting* microscope, which gives a clearer view of objects, with a greater power of magnifying at the same time.

The body of this microscope AAAA is a large tube, supported by three brass pillars *bbb*, rising from

a wooden pedestal C; in which pedestal is a drawer D, to hold the object-glasses and other parts of the apparatus. A lesser tube *ee* slides into the greater, and sends from its bottom another tube *f*, much smaller than itself, with a male screw *g* at the end thereof, whereon to screw the object-glass or magnifier. There are five of these magnifiers, numbered 1, 2, 3, 4, 5; which numbers are also marked on the inner tube, to direct whereabouts to place it according to the magnifier made use of: but if when it fits not the eye exactly, slide the inner tube gently higher or lower, or turn the screw of the magnifier gradually, till the object appears distinct. The greatest magnifiers have the smallest apertures and the lowest numbers.

L, is a circular plate of brass fixed horizontally between the three brass pillars, and in the centre thereof a round hole M is adapted to receive a proper contrivance N for holding ivory sliders wherein objects are placed: this contrivance consists of a spiral steel wire confined between three brass circles, one whereof is moveable for the admission of a slider. O is a round brass plate with several holes for placing objects in, some of which are usually furnished with them at the shops: but two holes are commonly reserved for small concave glasses, whereon to place a drop of any liquid, in order to view the animalcules, &c. There is also a piece of white ivory, and a piece of black ebony, of the same size and shape as the holes for objects: the ivory is for holding such opaque objects as are black, and the ebony such as are white, by which contrariety of colours they will be seen more distinctly. At the bottom of this object-plate is a button to slip into a slit P, that fits it, on the circular plate of brass: and by turning it round on this, all the objects may be examined successively with very little trouble.

Q, is a concave speculum set in a box of brass, and turning in an arch R, upon two small screws *rr*. From the bottom of the arch comes a pin, which being let down into a hole *z*, in the centre of the pedestal, enables the speculum to turn either vertically or horizontally, and to reflect the light directly upwards on the object to be viewed. V, is a plano-convex lens, which by turning on two screws *ss*, when the pin at the bottom of it is placed in the hole W, for its reception in the circular plate L, will transmit the light of a candle to illuminate any opaque object that is put on the round piece of ivory or on the ebony for examination: and it may be moved higher or lower, as the light requires. This glass is of service to point the sunshine or the light of a candle upon any opaque object, but in plain day-light is of no great use. X, is a cone of black ivory, to fasten on a shank underneath the brass circular plate L, principally when the first or second magnifier is made use of, and the object very transparent: for objects are rendered much more distinctly visible, by intercepting some part of the oblique rays which come from the speculum. The brass fish-pan Y is to fasten any small fish upon, to see the circulation of the blood in its tail. For this purpose, the tail of the fish must be expanded across the oblong hole at the smallest end of the pan: then by slipping the button on the backside of the pan into the slit P thro' the circular plate L,

Fig. 1.*Fig. 2.**Fig. 3.*

L, the spring that comes from the button will make it steady, and prevent it well to view. But if it be a frog, a newt, or an eel, in which the circulation is desired to be shewn, a glass tube *r* is fittest for the purpose. The tail of a newt or eel, or, in a frog, the web between the toes of the hind-feet, are the parts where it may be seen best. When the object is well expanded on the inside of the tube, slide the tube along under the circular brads plate *L*, (where there are two springs and a cavity made in the shank to hold it), and bring your object directly under the magnifier.

There are three of these glass tubes smaller one than another, and the size of the object must direct which of them is to be used; but, in general, the less room the creature has to move about in, the easier will it be managed.

The cell *z*, with a concave and a plane glass in it, is intended to confine fleas, lice, mites, or any small living objects, during pleasure; and by placing it over the hole *M*, in the middle of the circular brads plate, they may be viewed with much convenience. Three loose glasses, viz. one plane, and two concave, belong also to this microscope; and are designed to confine objects, or to place them upon occasionally. The long steel wire *3*, with a pair of plyers at one end, and a point on the other, to hold fast or stick objects upon, slips backward or forward in a short brads tube where-to a button is fastened, which fits into the little hole *z*, near the edge of the brads plate *L*: and then the object may be readily brought to a right position, and a light be cast upon it either by the speculum underneath, or, if it be opaque, by the plano-convex lens *V*. 4, Is a flat piece of ivory called a *slider*, with four round holes thro' it, and objects placed in them, between Muscovy talcs or isinglasses, kept in by brads wires. It is proper to have a number of these sliders, filled with curious objects, always ready, as well as some empty ones for any thing new that offers. When made use of, thrust them between the brads rings of the contrivance on purpose for them, which shoots into the round hole *M*, in the centre of the brads plate *L*. This keeps them steady, and at the same time permits them to be moved to and fro for a thorough examination. 5, Is a little round ivory box to hold pieces of isinglass for the sliders; 6, a small hair-brush to wipe off any dust from the glasses, or to apply a drop of any liquid; 7, a pair of nippers to take up any object to be examined.

§ 6. The Microscope for Opaque Objects.

THIS microscope remedies the inconvenience of having the dark side of an object next the eye, which formerly was an unfurmoutable objection to the making observations on opaque objects with any considerable degree of exactness or satisfaction: for, in all other contrivances commonly known, the nearness of the instrument to the object (when glasses that magnify much are used) unavoidably overhadows it so much, that its appearance is rendered obscure and indistinct. And, notwithstanding ways have been tried to point light upon an object, from the sun or a candle, by a convex glass placed on the side thereof, the rays from either can be thrown upon it in such an acute angle only, that they serve to give a confused glare, but are insufficient to afford a clear and perfect

view of the object. But in this microscope, by means of a concave speculum of silver highly polished, in whose centre a magnifying lens is placed, such a strong and direct light is reflected upon the object, that it may be examined with all imaginable ease and pleasure. The several parts of this instrument, made either of brads or silver, are as follow.

Thro' the first side *A*, passes a fine screw *B*, the Plate other end of which is fastened to the moveable side *C*. CCXIX. *D* is a nut applied to this screw, by the turning of ^{fig. 4.} which the two sides *A* and *C* are gradually brought together. *E*, is a spring of steel that separates the two sides when the nut is unscrewed. *F* a piece of brads, turning round in a socket, whence proceeds a small spring-tube moving upon a rivet, thro' which tube there runs a steel wire, one end whereof terminates in a sharp point *G*, and the other hath a pair of plyers *H* fastened to it. The point and plyers are to thrust into, or take up and hold, any insect or object; and either of them may be turned upwards, as best suits the purpose. *I*, is a ring of brads, with a female screw within it, mounted on an upright piece of the same metal; which turns round on a rivet, that it may be set at a due distance when the least magnifiers are employed. This ring receives the screws of all the magnifiers. *K*, is a concave speculum of silver, polished as bright as possible; in the centre of which is placed a double convex lens, with a proper aperture to look thro' it. On the back of this speculum, a male screw, *L*, is made to fit the brads ring *I*, to screw into it at pleasure. There are four of these concave specula of different depths, adapted to four glasses of different magnifying powers, to be used as the objects to be examined may require. The greatest magnifiers have the least apertures. *M*, is a round object-plate, one side of which is white and the other black: The intention of this is to render objects the more visible, by placing them, if black, on the white side, or, if white, on the black side. A steel ring, *N*, turns down on each side to make any object fast; and insuring from the object-plate is a hollow pipe to screw it on the needle's point *G*. *O* is a small box of brads, with a glass on each side, contrived to confine any living object, in order to examine it: this also has a pipe to screw upon the end of the needle *G*. *P*, is a turned handle of wood, to screw into the instrument when it is made use of. *Q*, a pair of brads plyers to take up any object, or manage it with convenience. *R* is a soft hair-brush for cleaning the glasses, &c. *S*, is a small ivory box for isinglasses, to be placed, when wanted, in the small brads box *O*.

When you would view any object with this microscope, screw the speculum, with the magnifier you think proper to use, into the brads ring *I*. Place your object, either on the needle *G* in the plyers *H*, on the object-plate *M*, or in the hollow brads box *O*, as may be most convenient: then holding up your instrument by the handle *P*, look against the light thro' the magnifying lens; and by means of the nut *D*, together with the motion of the needle, by managing its lower end, the object may be turned about, raised, or depressed, brought nearer the glass, or removed farther from it, till you hit the true focal distance, and the light be seen strongly reflected from the speculum upon the object, by which means it will be shewn in a

manner

manner surprisingly distinct and clear; and for this purpose the light of the sky or of a candle will answer very well. Transparent objects may also be viewed by this microscope: only observing, that when such come under examination, it will not always be proper to throw on them the light reflected from the speculum; for the light transmitted thro' them, meeting the reflected light, may together produce too great a glare. A little practice, however, will shew how to regulate both lights in a proper manner.

§ 7. *The Solar Microscope.*

THIS instrument is composed of a tube, a looking-glass, a convex lens, and Wilson's single pocket microscope before described. The sun's rays being directed thro' the tube, by means of the looking-glass, upon the object, the image or picture of the object is thrown distinctly and beautifully upon a screen of white paper, or a white linen sheet, placed at a proper distance to receive the same; and may be magnified to a size not to be conceived by those who have not seen it: for the farther the screen is removed, the larger will the object appear; inasmuch, that a louse may thus be magnified to the length of five or six feet, or even a great deal more; though it is more distinct, when not enlarged to above half that size.—The apparatus for this purpose is as follows.

Plate
CCXXX.
fig. 1.

A, a square wooden frame, thro' which pass two long screws affixed by a couple of nuts 1, 1. Fasten it firmly to a window-shutter, wherein a hole is made for its reception; the two nuts being let into the shutter, and made fast thereto. A circular hole is made in the middle of this frame to receive a piece of wood, B, of a circular figure; whose edge, that projects a little beyond the frame, composes a shallow groove 2, wherein runs a catgut 3; which, by twisting round, and then crossing over a brass pulley 4, (the handle whereof, 5, passes thro' the frame) affords an easy motion for turning round the circular piece of wood B, with all the parts affixed to it. C is a brass tube covered with seal-skin; which, screwing into the middle of the circular piece of wood, becomes a case for the uncovered brass tube D to be drawn backwards or forwards in. E is a smaller tube, of about one inch in length cemented to the end of the larger tube D. F is another brass tube, made to slide over the above described tube E; and to the end of this the microscope must be screwed, when we come to use it. 5, a convex lens, whose focus is about 12 inches, designed to collect the sun's rays, and throw them more strongly upon the object. G is a looking-glass of an oblong figure, set in a wooden frame, fastened by hinges in the circular piece of wood B, and turning about therewith by means of the abovementioned cat-gut. H is a jointed wire, partly brass, and partly iron; the brass part whereof, 6, which is flat, being fastened to the looking-glass, and the iron part, 7, which is round, passing thro' the wooden frame, enable the observer, by putting it backwards or forwards, to elevate or depress the glass according to the sun's altitude. There is a brass ring at the end of the jointed wire, whereby to manage it with the greater ease. The extremities of the cat-gut are fastened to a brass pin, by turning of which it may be braced up, if at any time it becomes too slack.

When this microscope is employed, the room must be rendered as dark as possible; for on the darkness of the room, and the brightness of the sunshine, depend the sharpness and perfection of your image. Then putting the looking-glass G thro' the hole in your window-shutter, fasten the square frame A to the shutter by its two screws and nuts 1, 1. This done, adjust your looking-glass to the elevation and situation of the sun, by means of the jointed wire H, together with the cat-gut and pulley, 3, 4. For the first of these raising or lowering the glass, and the other inclining it to either side, there results a twofold motion, which may easily be so managed as to bring the glass to a right position, that is, to make it reflect the sun's rays directly thro' the lens, 5, upon the paper screen, and form thereon a spot of light exactly round. But tho' the obtaining a perfect circular spot of light upon the screen before you apply the microscope, is a certain proof that your looking-glass is adjusted right, that proof must not always be expected: for the sun is so low in winter, that if it shines in a direct line against the window, it cannot then afford a spot of light exactly round; but if it be on either side, a round spot may be obtained, even in December. As soon as this appears, screw the tube C into the brass collar provided for it in the middle of your wood-work, taking care not to alter your looking-glass: then screwing the magnifier you choose to employ to the end of your microscope, in the usual manner, take away the lens at the other end thereof, and place a slider, containing the object to be examined, between the thin brass plates, as in the other ways of using the microscope.

Things being thus prepared, screw the body of your microscope to the short brass tube F; which slip over the small end E of the tube D, and pull out the said tube D less or more, as your object is capable of enduring the sun's heat. Dead objects may be brought within about an inch of the focus of the convex lens, 5; but the distance must be shortened for living creatures, or they will soon be killed.

If the light falls not exactly right, you may easily, by a gentle motion of the jointed wire and pulley, direct it thro' the axis of the microscopic lens. The short tube F, to which the microscope is screwed, renders it easy, by sliding it backwards or forwards on the other tube E, to bring the objects to their focal distance; which will be known by the sharpness and clearness of their appearance: they may also be turned round by the same means, without being in the least disordered.

The magnifiers most useful in the solar microscope are in general, the fourth, fifth, or sixth. The screen on which the representations of the objects are thrown, is usually composed of a sheet of the largest elephant paper, strained on a frame which slides up or down, or turns about at pleasure on a round wooden pillar, after the manner of some fire-screens. Larger screens may also be made of several sheets of the same paper pasted together on cloth, and let down from the ceiling with a roller like a large map.

“This microscope (says Mr Baker) is the most entertaining of any; and perhaps the most capable of making discoveries in objects that are not too opaque: as it shews them much larger than can be done
any

any other way. There are also several conveniences attending it, which no other microscope can have: for the weakest eyes may use it without the least straining or fatigue: numbers of people together may view any object at the same time, and, by pointing to the particular parts thereof, and discoursing on what lies before them, may be able better to understand one another, and more likely to find out the truth, than in other microscopes, where they must peep one after another, and perhaps feel the object neither in the same light nor in the same position. Those also, who have no skill in drawing, may, by this contrivance, easily sketch out the exact figure of any object they have a mind to preserve a picture of; since they need only fasten a paper on the screen, and trace it out thereon either with a pen or pencil, as it appears before them. It is worth the while of those who are desirous of taking many draughts in this way, to get a frame, wherein a sheet of paper may be put in or taken out at pleasure; for if the paper be single, the image of an object will be seen almost as plainly on the back as on the fore side, and, by standing behind the screen, the shade of the hand will not obstruct the light in drawing, as it must in some degree when one stands before it."

§ 8. Universal Microscope.

ABC, is the body of the microscope.
D, is a joint, by which it is moveable vertically.
E, is a hollow square socket, with
F, a screw, by which it is fixed to the part at D.
DOR is a strong brass pillar or stand.
S, T, V, the tripod, or three feet, on which it stands.

GHI is a stage on which objects of different sorts are placed to be viewed.

K, is a strong screw by which the stage is rendered moveable horizontally.

MN, are two brass sockets, connected by an adjusting screw, and moveable up and down upon the square part of the stand.

O is a screw for fixing the socket M.

P is a long adjusting screw by which the socket N is moveable, and the objects upon the stage adjusted to the view.

W is a concave mirror, or speculum, fixed at

X, just under the central part of the stage, for illuminating transparent objects.

Y is a concave lens moveable at

Z, in a spring socket; by this lens opaque bodies are sufficiently enlightened for the view.

This compound microscope is in the best manner adapted to view transparent objects; for if they are such as can be put into the concave glass in the middle of the stage at H, then they will be sufficiently enlightened by the reflector W below, in one side of which is a plane speculum, and in the other a concave one, as both sorts are occasionally necessary.

If the transparent objects are such as may be included between talcs in the ivory sliders, then there is a part ABCD, called the *slider-holder*, which is fitted to the hole at H in the middle of the stage, and in which all the variety of objects in sliders may be viewed to great perfection by reflected light from the speculum W below.

As some curious experiments with transparent objects require the light to be very pure, and adjusted to a proper degree, there is an inverted cone of brass, ABC, to be placed in the under part of the hole at Fig. 3. H by its broad end or base AC; and by the narrow end B only the inferior and purer light contained in the upper and denser part of the large cone of rays reflected by the speculum W, can illuminate the objects to be viewed. This cone is indeed of more immediate use in the single microscope, to be mentioned by and by. Thus, it is plain, in one or other of these ways all kinds of transparent objects are to be viewed in the utmost perfection.

In this construction it is also as evident, that every opaque object may be shewn as well in this as in that which is usually called the *opaque microscope*: because here is all the same apparatus for that purpose, and much more; for this is both a single and compound opaque microscope.

Thus, if any opaque object be laid upon the glass at H, it may be very strongly illuminated by the lens Y, moveable higher or lower in the socket Z, to make the light upon the object greater or less, as occasion requires. In this case you have the advantage of a large and delightful field of view, and objects of all shapes and sizes are immediately viewed upon the stage GHI, as it is so easily moved up and down by the sliding sockets M and N, fastened in any position by the screw O, and adjusted for the most accurate inspection by the screw P.

In many cases it may be requisite to view light-coloured objects upon a dark ground, and the contrary: therefore, to answer such purposes, there is provided a round flat piece of ivory, with one side white and the other black, fitted into the hole at G, and to be taken in and out at pleasure.

To answer these purposes still more generally, there is a pair of piers, AB, moveable in a brass spring Fig. 4. socket at C, and by the flank at D it is fitted in the hole of the stage at I, where it has a horizontal motion, and also a vertical motion (up and down) by its joint at E. By the pincers at the end A any object may be very readily adjusted to the view, and illuminated by the lens Y. Also at the other end of the piers B, there is a small cylindric piece of ivory F screwed on, with one end black, the other white, for the above-mentioned purposes.

But oftentimes objects will be found which require the use of the piers AB, and are seen to the greatest advantage by light reflected upon them; for which purpose a small concave metallic speculum AB is screwed into the end CD of a tube CDEF, which is Fig. 5. made to go on upon the pipe of the microscope; and the large cone of reflected light from the mirror W will pass through the hole H to this small concave AB, by which it will be reflected upon the object in the piers at A, but more especially upon the ivory at F, where exceeding small objects require the greatest degree of light they can bear.

Further, to make this microscope answer all the ends of a single opaque microscope, there is a brass piece AB, with a square hole or socket, to go on upon the Fig. 6. flank at D (Fig. 1.) when the body of the microscope ABC is taken off, and is there made fast by the screw C.

C. To this is annexed a strong brafs ring DE, into which are screwed the fame *Liberkhuus*, as they are called, or concaves with a small lens in the middle of each, as are used in the single opaque microscope; and being applied to objects on the stage GHI, or in the plecters, they are viewed in the same manner here as they are there; with this additional advantage, that in the present microscope, the light is much more intense from the speculum W, than the common light but once reflected in the usual form of this instrument.

Lastly, every thing shewn in the aquatic microscope is to be seen equally in this; because, since the hole at H in the stage is very large, it will admit of a concavity sufficiently capacious for any purposes of viewing objects in water, of any sort whatsoever. And not only the magnifiers, but the mode of applying them, is nearly the same here as in those of the common form. But in this construction, you have both the single and compound aquatic microscope: for the stage GHI being moveable horizontally, and the magnifier at A moving vertically on the joint at D, it is plain, every part of the water in the concave glass at H may be brought under it, and the most minute objects well enlightened by the concave AB, and shewn with great distinctness.

The other parts of the apparatus are common to all microscopes. Every body knows the use of the ivory sliders, for holding and applying transparent objects as above directed, (fig. 7.). But in fig. 8. you have the form of a brafs slider, with several small glass concaves fixed in one side, and over them a slip of clear plain glass is made to slide in the frame, and thereby to confine in the hollow of the glasses very small living objects, as a flea, louse, mite, &c. and prevent their crawling out of the field of view.

There is also what is called a *bug-box*, consisting of two parts: the lowest contains a large concave; and the upper part contains a plane glass, which, being screwed upon the concave, will confine any larger animal, as a bug, an ant, a spider, a small fly, &c.

As the circulation of the blood is one of the noblest experiments of the microscope, so ample provision is made for it by a set of glass tubes of different sizes for applying the transparent parts of proper objects for that purpose, such as small fish, tadpoles, and water-nets, the best subject of all; such a tube is AB (fig. 9.) It being necessary to stop the open end B, when the animal is in, with a cork, there is a small hole at the other end A to give air to the animal. These tubes are applied to the hole H in the stage by two steel springs on the under part, bent to receive them.

In case it be required to view the circulation in the tail of a large fish, as a gudgeon, loach, &c. there is an instrument of brafs called the *fish-pan*, (fig. 10.) contrived of a proper form to hold and confine it; where ABD is the incurved plate to receive the body of the fish; CFG is a ribbon to tie the fish to the said plate or pan, and is kept tight by a spring behind at H. At the end AD, is a long transverse hole or slit, over which the transparent tail of the fish is placed; and then by the Shank at E, on the under side, it is put upon the stage thro' a hole at I, and there easily adapted to the magnifier A, by moving it every way under the same.

It is often required to see what many small objects are, and how they are best disposed in sliders, glasses, tubes, &c. for which purpose there is a hand-magnifier ABC, (fig. 11.) containing a lens of about one inch focal distance, to be used upon all such occasions.

Besides the above particulars, there is a pair of nippers (or forceps) to take up small objects, in order to place them on the stage, between the talcs, &c. also a camel-hair brush, for cleaning talcs, glass, &c. A small wire, with a spiral screw at the end, for holding cotton, &c. for cleaning the glass tubes. A little ivory box with spare talcs, and wires to fasten them in the sliders. A piece of shammy leather is useful upon all occasions for wiping the glasses of every sort, as it will cleanse them well without hurting their surfaces.

§ 9. Clark's Improved Pocket Microscope.

THIS is represented in Plate CCXX. where ABC DEF (fig. 2. n° 1.) is a box three inches broad, four inches long, and one inch deep, covered with shagreen, and having the lid open, which when shut is fastened by clasps as in the figure. This box serves for the pedestal as well as case of the instrument. *abcd*, is a solid piece of wood, fixed in the middle of the box; on which is screwed a brafs plate *ef*, having in the middle a female screw for holding the other parts now to be described.

aβ, n° 2. Is a piece of brafs of the shape represented in the plate, having a male screw at *a*, answering to the female one abovementioned at *g*, and by which this part is firmly fixed upright in the middle of the box. On the lower part of this piece of brafs is fastened, but in such a manner as to be moveable at the joint *s*, a semicircle of brafs *cr*, in which is a concave speculum *iii*, ground to a focus of about eight inches: it is moveable in the ring, by means of two pivots; and as the ring itself is also moveable, it is plain that the speculum may be moved to a proper distance from the standard. The face of it is placed next the standard when the instrument is put into the case, in order to prevent the polished surface from injury. *γ* Is a piece of solid brafs, which goes into a dovetail slit in the part next to be described, and which Mr Clark calls the *stage*. This consists of two pieces, n° 3. One of these, *xxxx*, is a parallelogram of brafs, in which the other part *yzyz* slides up or down by means of the screw *mn*. From the upper part of this, proceeds at right angles another piece *yzrs*. This is formed of two pieces of brafs riveted at *y* and *z*, and joined to each other at their extremities by the cross piece *rs*. Upon this slides another piece *1, 2, 3, 4*, having in it a round hole *5*, and which can be made to approach either to *yz* or to *rs* as occasion requires. This part, by means of the dovetail slit at *xx*, may be put on the solid piece of brafs at *γ* of the former, and secured in a perpendicular position on the top of it.

The last part of this microscope is represented n° 4. It consists of a solid piece of brafs *opqt*, to which is fixed at right angles the piece *opv*; *v* is a small plane speculum, with the reflecting side downwards, and, by means of a joint, capable of being raised up or let down as the observer finds necessary. To the under side



NEWTONIAN TELESCOPE.

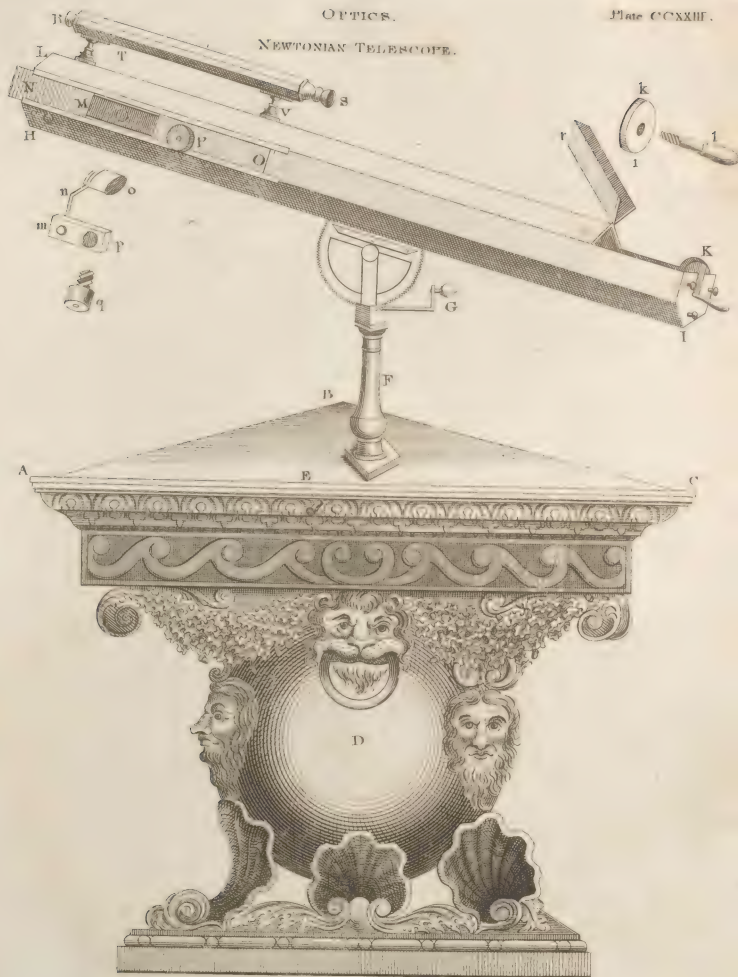




Fig. 1.

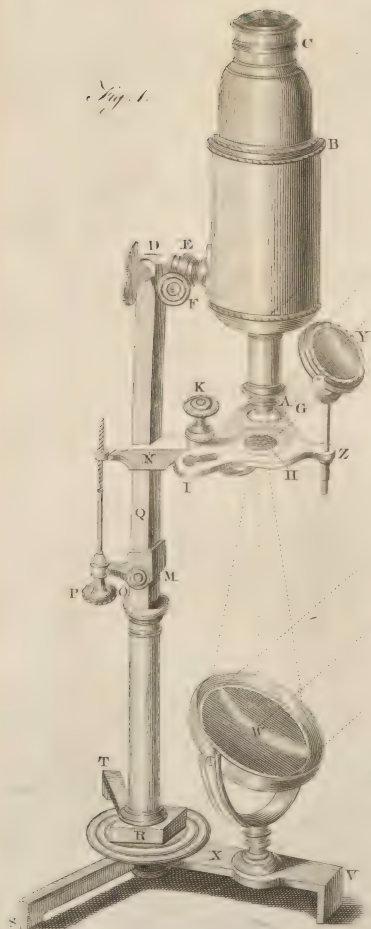


Fig. 2.



Fig. 3.



Fig. 4.



Fig. 6.



Fig. 5.

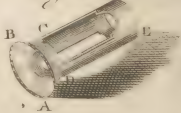


Fig. 8.

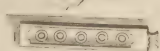


Fig. 7.

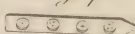


Fig. 10.



Fig. 9.

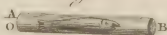
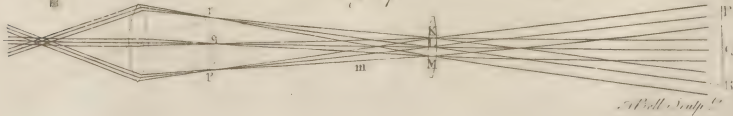
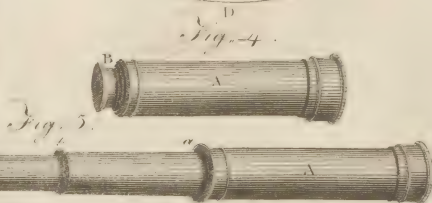
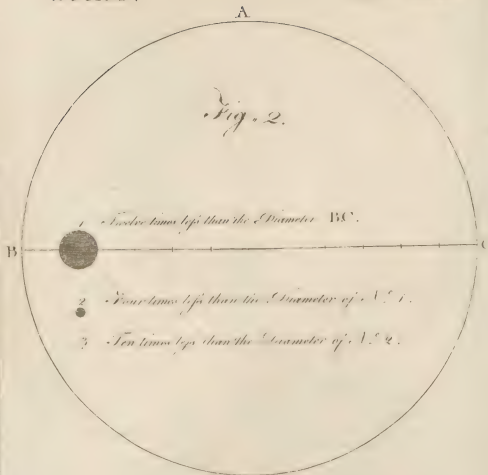
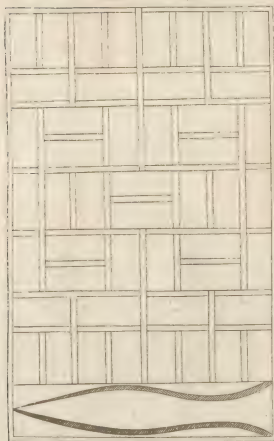
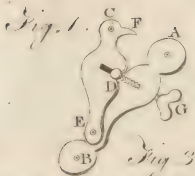


Fig. 11.







side of the fore-part of this is placed a small brass circle, the edges of which appear at u and v , and which is fully represented in n° 5. Round this circle the magnifiers are disposed, and over against each of them is engraved its magnifying power, expressed by 1, 2, 3, 4, 5, the highest numbers magnifying most. This circle is movable; and so disposed, that, as it turns round, the magnifiers appear successively through the hole at u , at the same time that the power of each is shewn by the cipher which appears through the little square hole at v , n° 4. This whole part of the machine slides up and down on the back of the other, by means of a dovetail; and thus, though the part $o p q v$ is always above and parallel to the stage, yet it may be brought nearer to it or removed farther off at pleasure.

On the solid black plate are marked the numbers 1, 2, 3, 4, 5, to shew the foci of the different magnifiers. Concerning the proper method of using this microscope, Mr Clark gives the following directions.

When the case is opened, take out the microscope, which consists of two separate parts; screw the under part (on which the speculum is) into the brass plate in the inside of the case, which is the base for the instrument while in use.—Put the other end into the dovetail slit behind the handle of the adjusting screw mn , n° 3. place the microscope so as the speculum may front the light; then gently move up the back part by the button for that purpose, till the figure 1, on the plate $p q t$, (n° 4.) appears just above the stage: then turn round the circular plate which contains the magnifiers, being five in number, till 1 appear in the square hole a -top. Put the slider with the objects into the stage; give the concave speculum such an inclination as to throw the rays through the object immediately under the magnifier: thereabout distinct vision will be had; if not entirely so, a turn or two of the adjusting screw will either raise or depress the stage, as the eye or object requires: and so on with each magnifier and corresponding figure, always taking care that the speculum be in such a situation as to throw the light properly up.

The slider for opaque objects consists of three divisions; first, ebony, for laying all white or light-coloured objects on, such as seeds, sands, mineral, &c. The second division ivory, for all dark and black bodies. The third division glass, which opens and shuts; when open, for the circulation of the blood in tadpoles, &c. when shut, for confining any live object to be examined, and for all kinds of animalcules in fluids, solutions of salts, &c. Likewise there are on the side of the above slider, a pair of small forceps, that turn out at pleasure, to hold any opaque or transparent object, such as a fly, spider, &c. which may be viewed with the aid of one or both speculums to great advantage. See n° 6.

When this microscope is employed for examining an opaque object, the upper speculum must be bent down to such an angle as to throw the rays reflected from the under speculum upon the opaque object in view: with the sun or candle-light, those two speculums have a most delightful effect. The rays from the under speculum, passing through the square opening $g z$, 1, 2, (n° 3.) behind the stage, fall on the small upper plane speculum, which, moving on an axis, may

be placed in a direction so as to illuminate the opaque object with the whole light proceeding from the large concave speculum. In this operation all the magnifiers but n° 5. may be used with success and satisfaction.

§ 10. Of Extempore Microscopes.

For those who cannot conveniently procure the apparatus of any of the above-mentioned microscopes, it may afford some entertainment to try the magnifying power of small globules of water, which in some cases is very considerable. The inventor of this method of viewing objects was Mr Stephen Gray, who gives an account of it in the Philosophical Transactions N° 221, 223. "Having observed, says he, some irregular particles within the glass globules (for microscopes), and finding that they appeared distinct, and prodigiously magnified when held close to my eye; I concluded, that if I conveyed a small globule of water close to my eye, in which there were any opacous or less transparent particles than water, I might see them distinctly. I therefore took on a pin a small portion of water, which I knew to have in it some minute animals, and laid it on the end of a small piece of brass wire that then lay by me, about $\frac{1}{2}$ of an inch in diameter, till there was formed somewhat more than an hemisphere of water. Then keeping the wire erect, I applied it to my eye, and, standing at a proper distance from the light, I saw them and some irregular particles, as I had predicted; but mostly enormously magnified. For, whereas they were scarce discernable by my glass microscope, they appeared within the globule not much different in form, nor less in magnitude, than ordinary peas. They cannot be well seen by day-light, unless the room be darkened; but most distinctly by candle-light. They may also be very well seen by the light of the full moon."

But Mr Gray tells us, that these little animals will appear more distinctly, if drops of water be conveyed by a pin's point into a round hole made in a brass plate whose thickness is about one tenth of an inch, and the diameter of the cylindrical hole a little less than half a tenth; observing to fill it till near an hemisphere of water be extant on each side of it. Now, supposing the axis of this cylinder of water to be terminated by equal spherical surfaces, and to be exactly equal to three diameters of the spheres of those surfaces; in that case the little animals seen by reflection from the farther surface, will appear just twice as big in diameter, as if they were placed in the focus of one of those spheres of water, and were seen thro' it as in common microscopes. His description of the animalcules thus observed is curious. "They are (says he) of a globular form, and but little less transparent than the water they swim in. They have sometimes two dark spots diametrically opposite; but these are rarely seen. There are sometimes two of these globular insects sticking together, and the place of junction is opacous: possibly they may be in the act of generation. They have a twofold motion; a swift progressive regular one, and at the same time a rotation about their axes, at right angles to the diameter that joins their dark spots; but this is only seen when they move slowly. They are almost of an incredible minuteness. Mr Leeuwenhoek is moderate

enough in his computation, when he tells us that he saw insects in water so small that 30,000 of them could scarcely equal a grain of coarse sand. But I believe it will seem a paradox to him when he is told, that he may see them by only applying his eye to a portion of water wherein they are contained. I have examined many transparent fluids, as water, wine, brandy, vinegar, beer, spittle, urine, &c. and do not remember to have found any liquors without these insects. But I have not seen many in motion, except in common water that has stood, for sometimes a longer, at others a shorter time. In the rivers, after the water has been thickened by rain, there are such infinite numbers of them, that the water seems in great part to owe its opacity and whiteness to those globules. Rain-water, as soon as it falls, has many, and snow-water has more of them. The dew that stands on glass windows has many of them: and for as much as rains and dews are continually ascending and descending, I believe we may say the air is full of them. They seem to be of the same specific gravity with the water they swim in; the dead remaining in all parts of the water. Of the many thousands that I have seen, I could discern no sensible difference in their diameters; they appear of equal bignesses in water that has been boiled: they retain their shapes, and will sometimes revive."

The same ingenious author describes another water-microscope of his own invention, as follows. "AB I call the frame of the microscope; it may be about $\frac{1}{10}$ of an inch in thickness. At A there is a small hole near $\frac{1}{3}$ of an inch in diameter, in the middle of a spherical cavity about $\frac{1}{4}$ of an inch in diameter, and in depth somewhat more than half the thickness of the brass. Opposite to this, at the other side of the brass, there is another spherical cavity, half as broad as the former; and so deep as to reduce the circumference of the small hole above-mentioned, almost to a sharp edge. In these cavities the water is to be placed, being taken upon a pin or a large needle, and conveyed into them till there be formed a double convex lens of water; which, by the concavities being of different diameters, will be equivalent to a double convex lens of unequal convexities. By this means I find the object is rendered more distinct than by a plano-convex of water, or by a double convex formed on the plane surfaces of a piece of metal. CDE is the supporter whereon to place the object; if it be water, in the hole C; if a solid, on the point F. This is fixed to the frame of the microscope by the screw E, where it is bent upwards, that its upper part CF may stand at a distance from the frame AB. It is moveable about the screw E as a centre, in order that either the hole C, or the point F, may be exposed before the microscope A, and that the object may be brought to, and fixed in its focus. There is another screw, about half an inch in length, which goes through a round plate in the frame of the microscope AE, the screw and plate taking hold of the supporter about D, where there is a slit somewhat larger than the diameter of the screw. This is requisite for the admission of the hole C, or point F, according to the nature of the object, into the focus of the watery lens at A. For, by turning the screw G, the supporter is carried to or from the same; which may be

sooner done, if, while one turns the screw with one hand, the other holds the microscope by the end B; and one be looking through the water, till the object be seen most distinctly. The supporter must be made of a thin piece of brass, well hammered, that, by its spring, it may better follow the motion of the screw. I choose rather to fix the supporter by the screw E, than by a rivet; because it may now, by the help of a knife, be unscrewed, and, by the other screw G, be brought close to the frame of the microscope, without weakening its spring, and so become more conveniently portable. If the hole C in the supporter be filled with water, but not so as to be spherical, all objects that will bear it are seen therein more distinctly. The hole at B is made for seeing animals in water by reflection from its farther surface as above described."

§ 11. To find the Magnifying Power of Glasses employed in Single Microscopes.

THE apparent magnitude of any object, as must appear from what hath been already delivered, is measured by the angle under which it is seen; and this angle is greater or smaller, according as the object is near to or far off from the eye; and of consequence the less the distance at which it can be viewed, the larger it will appear. The naked eye is unable to distinguish any object brought exceedingly near it: but looking through a convex lens, however near the focus of that lens be, there an object may be distinctly seen; and the smaller the lens is, the nearer will be its focus, and in the same proportion the greater will be its magnifying power. From these principles it is easy to find the reason why the first or greatest magnifiers are so extremely minute; and also to calculate the magnifying power of any convex lens employed in a single microscope: For as the proportion of the natural light is to the focus, such will be its power of magnifying. If the focus of a convex lens, for instance, be at one inch, and the natural sight at eight inches, which is the common standard, an object may be seen through that lens at one inch distance from the eye, and will appear in its diameter eight times larger than it does to the naked eye: but as the object is magnified every way, in length as well as in breadth, we must square this diameter to know how much it really is enlarged; and we then find that its superficies is magnified 64 times.

Again, suppose a convex lens whose focus is only one-tenth of an inch distant from its centre; as in eight inches, the common distance of distinct vision with the naked eye, there are 80 such tenths, an object may be seen through this glass 80 times nearer than with the naked eye. It will, of consequence, appear 80 times longer, and as much broader, than it does to common sight; and therefore is 6400 times magnified. If a convex glass be so small that its focus is only $\frac{1}{10}$ of an inch distant, we find that eight inches contains 160 of these twentieth-parts; and of consequence, the length and breadth of any object seen through such a lens will be magnified 160 times, and the whole surface 25,600 times. As it is an easy matter to melt a drop or globule of a much smaller diameter than a lens can be ground, and as the focus of a globule is no farther off than a quarter of its own diameter,

diameter, it must of consequence magnify to a prodigious degree. But this excessive magnifying power is much more than counterbalanced by its admitting so little light, want of distinctness, and shewing such a minute part of the object to be examined; for which reason, these globules, though greatly in vogue some time ago, are now almost entirely rejected. Mr Leeuwenhoek, as has been already observed, made use only of single microscopes consisting of convex lenses, and left to the Royal Society a legacy of 26 of those glasses. According to Mr Folkes's description of these, they were all exceedingly clear, and shewed the object very bright and distinct; "which (says Mr Folkes) must be owing to the great care this gentleman took in the choice of his glass, his exactness in giving it the true figure, and afterwards, among many, reserving only such for his use as upon trial he found to be most excellent. Their powers of magnifying are different, as different objects may require: and as on the one hand, being all ground glasses, none of them are so small, and consequently magnify to so great a degree, as some of those drops frequently used in other microscopes; yet, on the other hand, the distinctness of these very much exceeds what I have met with in glasses of that sort. And this was what Mr Leeuwenhoek ever proposed to himself; rejecting all those degrees of magnifying in which he could not so well obtain that end. For he informs us in one of his letters, that though he had, above 40 years by him, glasses of an extraordinary smallness, he had made but very little use of them; as having found, in a long course of experience, that the most consider-

able discoveries were to be made with such glasses as, magnifying but moderately, exhibited the object with the greatest brightness and distinctness."

In a single microscope, if you want to learn the magnifying power of any glass, no more is necessary than to bring it to its true focus, the exact place whereof will be known by an object's appearing perfectly distinct and sharp when placed there. Then, with a pair of small compasses, measure, as nearly as you can, the distance from the centre of the glass to the object you was viewing, and afterwards applying the compasses to any ruler, with a diagonal scale of the parts of an inch marked on it, you will easily find how many parts of an inch the said distance is. When that is known, compute how many times those parts of an inch are contained in eight inches, the common standard of sight, and that will give you the number of times the diameter is magnified: squaring the diameter will give the superficies; and, if you would learn the solid contents, it will be shewn by multiplying the superficies by the diameter.

The superficies of one side of an object only can be seen at one view; and to compute how much that is magnified, is most commonly sufficient: but sometimes it is satisfactory to know how many minute objects are contained in a larger; as suppose we desire to know how many animalcules are contained in the bulk of a grain of sand: and to answer this, the cube, as well as the surface, must be taken into the account. For the greater satisfaction of those who are not much versed in these matters, we shall here subjoin the following

TABLE of the MAGNIFYING POWERS of CONVEX GLASSES, employed in *Single Microscopes*, according to the distance of their focus: Calculated by the scale of an inch divided into 100 parts.

Shewing how many times the DIAMETER, the SUPERFICIES, and the CUBE of an OBJECT, is magnified, when viewed through such glasses, to an eye whose natural sight is at eight inches, or 800 of the 1000th-parts of an inch.

		Magnifies the Dia- meter.	Magnifies the Super- ficies.	Magnifies the Cube of an Object.	Times.
The focus of a glass at	$\frac{1}{20}$ or 50	16	256	4,096	
	$\frac{1}{15}$ or 40	20	400	8,000	
	$\frac{1}{10}$ or 30	26	676	17,576	
	$\frac{1}{7}$ or 20	40	1,600	64,000	
	15	53	2,809	148,877	
	14	57	3,249	185,193	
	13	61	3,721	226,981	
	12	66	4,356	287,496	
	11	72	5,184	373,248	
	$\frac{1}{8}$ or 10	80	6,400	512,000	
	9	88	7,744	681,472	
	8	100	10,000	1,000,000	
	7	114	12,996	1,481,544	
	6	133	17,689	2,352,637	
	$\frac{1}{5}$ or 5	160	25,600	4,096,000	
	4	200	40,000	8,000,000	
	3	266	70,756	18,821,096	
	$\frac{1}{2}$ or 2	400	160,000	64,000,000	
	1	800	640,000	512,000,000	

The greatest magnifier in Mr Leeuwenhoek's cabinet of microscopes, presented to the Royal Society, has its focus, as nearly as can well be measured, at one-twentieth of an inch distance from its centre; and consequently magnifies the diameter of an object 160 times, and the superficies 25,600. But the greatest magnifier in Mr Wilson's single microscopes, as they are now made, has usually its focus at no farther distance than about the 50th part of an inch; whereby it has a power of enlarging the diameter of an object 400, and its superficies 160,000 times.

The magnifying power of the solar microscope must be calculated in a different manner; for here the difference between the focus of the magnifier and the distance of the screen or sheet whereon the image of the object is cast, is the proportion of its being magnified. Suppose, for instance, the lens made use of has its focus at half an inch, and the screen is placed at the distance of five feet, the object will then appear magnified in the proportion of five feet to half an inch: and as in five feet there are 120 half-inches, the diameter will be magnified 120 times, and the superficies 14,400 times; and, by putting the screen at farther distances, you may magnify the object almost as much as you please; but Mr Baker advises to regard distinctness more than bigness, and to place the screen just at that distance where the object is seen most distinct and clear.

With regard to the double reflecting microscope, Mr Baker observes, that the power of the object-lens is indeed greatly increased by the addition of two eyeglasses; but as no object lens can be used with them of so minute a diameter, or which magnifies of itself near so much as those that can be used alone, the glasses of this microscope, upon the whole, magnify little or nothing more than those of Mr Wilson's single one; the chief advantage arising from a combination of lenses being the sight of a larger field or portion of an object magnified in the same degree.

§ 12. To find out the real Size of Objects seen by Microscopes.

THOUGH, by the directions already given, the magnifying powers of microscopes may be easily calculated; yet if we examine extremely minute objects, the real size of them will still remain uncertain. For, though we may know that they are magnified so many thousand times, we can by that make but a very imperfect computation of their natural and true size; nor indeed can we come to any certain conclusion as to that, but by the mediation of some larger object whose dimensions we really know. For as bulk itself is merely comparative, the only way we can judge of the bigness of any thing is by comparing it with something else, and finding out how many times the lesser is contained in the larger body. The plainest and most practicable methods of doing this in microscopical objects are the following.

1. Mr Leeuwenhoek's method of computing the size of salts in fluids, of the animalcules in *fermine masculino*, in pepper-water, &c. was by comparing them with a grain of sand. By this, however, we must understand the coarse sea-sand, usually called *fouling-sand*, which is equal in bigness to several grains of writing sand. But to make our calculations still more certain, we must suppose them to be of such a size, that 100 of them placed in a row shall extend an inch in length. Mr Leeuwenhoek then made his calculations in the following manner.

He viewed thro' his microscope a single grain of sand, which we will suppose to be magnified as the round figure ABCD. Then, observing an animalcule swimming or running across it, (which suppose to be of the size 1,) considering and measuring this by his eye, he concludes, that the diameter of this animalcule is only $\frac{1}{12}$ of the diameter of the grain

of sand; consequently, according to the common rules, the superficies of the grain of sand is 144 times, and the whole contents 1728 times, larger than the animalcule.

Suppose again, that he sees among these another and smaller species of animalcules; one of which, 2, he likewise measures by his eye, and computes its diameter to be four times less than the former: then, according to the foregoing rules, the surface of this second animalcule will be 16, and the whole bulk 64, times less than the animalcule 1.

If farther, upon a nicer view, he discovers a third kind of animalcule, 3, so exceedingly minute, that, examining it in the former manner, he concludes the diameter to be 10 times smaller than the second sort; it will then follow, that 1000 of them are only equal in bigness to one of that sort. Hence, of the first sort, 1728 would be contained in a grain of sand; of the second, 110,592; and of the third, 110,592,000.

In this manner may the comparative size of small objects be judged of with tolerable certainty: particularly in the solar microscope; since the image of the object and of the grain of sand, or whatever else is thought proper to compare with it, may be really measured by a ruler or a pair of compasses, and the difference of their diameters most exactly found.

2. Mr Hooke describes his method in the following words. "Having rectified the microscope to see the desired object thro' it very distinctly; at the same time that I look upon the object thro' the glass with one eye, I look upon other objects at the same distance with my other bare eye: by which means I am able, by the help of a ruler divided into inches and small parts, and laid on the pedestal of the microscope, to cast as it were the magnified appearance of the object upon the ruler, and thereby exactly to measure the diameter it appears of thro' the glass; which being compared with the diameter it appears of to the naked eye, will easily afford the quantity of its being magnified." This method is recommended by Mr Baker as very good for multitudes of objects; and he declares from his own experience, that a little practice will render it exceedingly easy and pleasant.

3. Another very curious method for this purpose is described by Dr Jurin in his *Physico-Mathematical Dissertations*. Wind a piece of the finest silver-wire you can get a great many times about a pin, or some other such slender body, so closely as to leave no interval between the wire-threads; to be certain of which, they must be carefully examined with a glass. Then, with a small pair of compasses, measure what length of pin the wire covers; and applying the compasses with that measure to a diagonal scale of inches, you will find how much it is; after which, by counting the number of wire-rounds contained in that length, you will easily discover the real thickness of the single wire. This being known, cut it into very small pieces; and, when you examine the object, if it be opaque, draw some of these wires upon it; if transparent, under it; and by your eye compare the parts of the object with the thickness of such bits of wire as lie fairest to the view. By this method, Dr Jurin observed, that four globules of human blood would generally cover the breadth of a wire which he had found to be $\frac{1}{12}$ th part of an inch; and consequently that

that the diameter of a single globule was $\frac{1}{104}$ th of an inch; which was also confirmed by Leeuwenhoek, from observations made on the blood with a piece of the same wire.

4. Mr Martin in his Optics gives another method sufficiently easy. On a circular piece of glass, let a number of parallel lines be carefully drawn, with the fine point of a diamond, at the distance of $\frac{1}{104}$ th of an inch from each other. If this be placed in the focus of the eye-glass of a microscope, the image of the object will be seen upon these lines, and the parts thereof may be compared with the intervals: whereby its true magnitude or dimensions may be very nearly known; for the intervals of these lines, tho' scarce discernible to the naked eye, appear very large thro' the microscope. A contrivance of this kind may also be invented for such microscopes as a glass cannot be applied to in the above manner, by placing it under or behind the object, which will answer the same purpose. Here it will be easy to find what proportion an object, or any part thereof, bears to an interval between two lines, and then determine it in parts of an inch: for if the width of an object appears just one interval, we shall know it to be just one fortieth part of an inch; if half an interval, the 80th; if a quarter of an interval, the 160th; if one fifth, only the 200th part of an inch.

5. Dr Smith has an invention similar to this for taking exact draughts of objects viewed in double microscopes: for he advises to get a lattice made with small silver wires, or small squares drawn upon a plane glass by the strokes of a diamond, and to put into the place of the image formed by the object-glass. Then, by transferring the parts of the object seen in the squares of the glass or lattice upon similar corresponding squares drawn upon paper, the picture thereof may be exactly taken. A micrometer may also be applied to microscopes of the same form with those applied to telescopes; for by opening the hairs of the micrometer till they exactly correspond to a certain length, suppose $\frac{1}{104}$ th of an inch, and by observing the number of revolutions in this opening, the diameter of any other object, answering to a known number of revolutions, may be found by the golden rule.

§ 13. Of the Field of View in Microscopes.

This is always in proportion to the diameter of the lens made use of, and its power of magnifying, by which it may be determined: since, if the lens is extremely small, it magnifies a great deal, and consequently a very minute portion of an object only can be distinguished thro' it; for which reason the greatest magnifiers never should be employed but for the most minute objects. This consideration will direct to the use of such magnifiers as are most proper to be employed, which is of the utmost consequence in microscopical observations. On this subject Mr Baker gives the following short rule, viz. that the field of view differs not greatly from the size of the lens; and that the whole of any object much beyond that size, cannot be conveniently viewed thro' it. There is some difference, as to the visible area of an object, as seen thro' single or double microscopes; for the double shew a larger portion of it than the single, tho' magnified as much.

§ 14. Of Microscopic Objects, and the Method of preparing them for being examined.

Mr Hooke gives a general account of microscopic objects under the following denominations, viz. "exceeding small bodies, exceeding small pores, and exceeding small motions." The first must either be the parts of larger bodies; or things, the whole of which is exceedingly minute, such as small seeds, insects, sands, salts, &c. The second are the interstices between the solid parts of bodies, as in stones, minerals, shells, &c. or the mouths of minute vessels in vegetables, the pores in the skins, bones, &c. of animals, — Exceeding small motions are the movements of the several parts or members of minute animals, or the motion of the fluids contained either in animal or vegetable bodies.

Many, as Mr Baker observes, even of those who have purchased microscopes, are so little acquainted with their general and extensive usefulness, and so much at a loss for objects to examine by them, that, after diverting themselves and their friends some few times with what they find in the sliders bought with them, or two or three more common things, the microscopes are laid aside as of little farther value; and a supposition that this must be the case, prevents many others from buying them: whereas, among all the inventions that ever appeared in the world, none perhaps can be found so constantly capable of entertaining, improving, and satisfying the mind of man.

An examination of objects, in order to discover truth, requires a great deal of attention, care, and patience, together with some considerable skill and dexterity, (to be acquired by practice chiefly), in the preparing, managing, and applying them to the microscope. When any object comes to be examined, the size, contexture, and nature of it, should be duly considered, in order to apply it to such glasses and in such a manner as may shew it best. The first step towards this should constantly be, to view it thro' a magnifier that can take in the whole at once: for, by observing how the parts lie as to one another, we shall find it much easier to examine and judge of them separately if there be occasion. After having made ourselves acquainted with the form of the whole, we may divide it as we please; and the smaller the parts into which it is divided, the greater must be the magnifiers with which we view them.

The transparency or opacity of an object must also be regarded, and the glasses made use of must be suited to it accordingly: for a transparent object will bear a much greater magnifier than one that is opaque; since the nearness required in a large magnifier unavoidably darkens an opaque object, and prevents its being seen, unless by the microscope contrived on purpose for such objects. Most objects, however, become transparent by being divided into extremely thin or minute parts. Contrivance therefore is requisite to reduce them into such thinness or smallness as may render them most fit for examination.

The nature of the object, whether it be alive or dead, a solid or a fluid, an animal, a vegetable, or a mineral substance, must likewise be considered, and all the circumstances attended to, that we may apply it in the most convenient manner. If it be a living animal,

mal, care must be taken to squeeze, hurt, or decompose it as little as possible, that its right form, posture, and temper, may be discovered. If a fluid, and too thick, it must be thinned with water; if too thin, we must let some of its watery parts evaporate. Some substances are fittest for observation when dry, others again when moistened; some when fresh, and some after being kept a while.

Light is a thing next to be taken care of; for on this the truth of all our examination depends, and a very little experience will shew how differently objects appear in one position and kind of it, from what they do in another. So that we should turn them every way, and view them in every degree of light, from brightness even to obscurity; and in all positions to each degree; till we are certain of their true form, and that we are not deceived. For, as Mr Hooke says, it is very difficult, in many objects, to distinguish between a prominence and a depression, between a shadow and a black stain; and, in colour, between a reflection and a whiteness. The eye of a fly, for instance, in one kind of light, appears like a lattice drilled through with abundance of holes; in the sunshine, like a surface covered with golden nails; in one position like a surface covered with pyramids, in another with cones, and in other positions of quite other shapes.

The degree of light must be duly suited to the object: which if dark, will be best seen in a full and strong light; but, if very transparent, the light should be proportionably weak; for which reason there is a contrivance both in the single and double microscope to cut off abundance of its rays when such transparent objects are viewed by the greatest magnifiers.

The light of a candle, for many objects, and especially such as are exceedingly minute and transparent, is preferable to day-light. For others, daylight is best; that is, the light of a bright cloud. As for sunshine, it is reflected from objects with so much glare, and exhibits such gaudy colours, that nothing can be determined by it with certainty; and therefore it is to be accounted the worst light that can be had.

This opinion of sunshine, however, must not be extended to the solar microscope, which cannot be used to advantage without its brightest light: for in that way we see not the object itself, wherein the sunshine is cast, but only the image or shadow of it exhibited upon a screen; and therefore no confusion can arise from the glaring reflection of the sun-beams from the object to the eye, which is the case in other microscopes: but then, in this way, we must rest contented with viewing the true form and shape of an object without expecting to find its natural colour, since no shadow can possibly wear the colours of the body it represents.

Most objects require some management in order to bring them properly before the glasses. If they are flat and transparent, and such as will not be injured by pressure, the best method is to inclose them in sliders, between two Muscovy talcs or isinglafs. This way, the feathers of butterflies, the scales of fishes, the farinae of flowers, &c. the several parts and even whole bodies of minute insects, and a

thousand other things, may very conveniently be preserved. Every curious observer, therefore, will have them always ready to receive any accidental object, and secure it for future examination: and a dozen or two of these sliders properly furnished are a fine natural history.

In making a collection of objects, the sliders should not be filled promiscuously, but care taken to sort the objects according to their size and transparency; in such a manner that none may be put together in the same slider but what may be properly examined by the same magnifier: and then the slider should be marked with the number of the magnifier its objects are fittest for: that is, the most transparent, or minutest objects of all, which require the first magnifier to view them by, should be placed in a slider or sliders marked with number I, those of the next degree in sliders marked with number II, and so of the rest. This method will save abundance of time and trouble in shifting the magnifiers, which, without such sortment, must perhaps be done two or three times, in overlooking a single slider. The numbers marked out upon the sliders will likewise prevent our being at any loss what glass to apply to each. In placing your objects in sliders, a convex glass of about an inch focus, to hold in the hand, and thereby adjust them properly between the talcs, before you fasten them down with the brass rings, will be found very convenient.

Small living objects, such as lice, fleas, gnats, small bugs, minute spiders, mites, &c. may be placed between these talcs, without killing or hurting them, if care be taken not to press down the brass rings that keep in the talcs, and will remain alive even for weeks in this manner. But if they are larger than to be treated thus, either put them in a slider with concave glasses intended for that use, or in the cell described above, or else examine them stuck on the pin or held between the piers; either of which ways they may be viewed at pleasure.

If fluids come under examination, to discover the animalcules that may be in them, take up a small drop with your pen or hair-pencil, and place it on a single isinglass, which you should have in a slider ready, or else in one of the little concave glasses, and so apply it. But in case, upon viewing it, you find, as often happens, the animalcules swarming together, and so exceedingly numerous, that, running continually over one another, their kinds and real form cannot be known; some part of the drop must be taken off the glass, and then a little fair water added to the rest, will make them separate, and shew them distinct and well. And this mixture of water is particularly necessary in viewing the semen masculinum of all creatures; for the animalcules therein contained are inconceivably minute, and yet crowded together in such infinite numbers, that, unless it be diluted a great deal, they cannot be sufficiently separated to distinguish their true shape.

But if we view a fluid, to find what salts it may have in it, a method quite contrary to the foregoing must be employed: for then the fluid must be suffered to evaporate, that the salts, being left behind upon the glass, may the more easily be examined.

Another, and indeed the most curious way of examining

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aming fluids, is by applying them to the microscope in exceedingly small capillary tubes made of the thinnest glass possible. This was Mr Leeuwenhoek's method of discovering the shapes of salts floating in vinegar, wine, and several other liquors; and such tubes should be always ready to use as occasion requires.

For the circulation of the blood, frogs, newts, or fishes, are commonly made use of; and there are glass tubes in the single microscope, and a fish-pan as well as tubes in the double one, on purpose to confine these creatures, and bring the proper parts of them to view: these parts, in newts and fishes, are the tails, and in frogs the fine filmy membrane between the toes of the hinder legs. Though, if we can contrive to fasten down the creature, and bring our object to the magnifier, the circulation cannot possibly be seen so plainly any where as in the mesentery, or thin transparent membrane which joins the guts together; and this part, by pulling out the gut a little, may easily be adjusted to the magnifier.

To dissect minute insects, as fleas, lice, gnats, mites, &c. and view their internal parts, requires a great deal of patience and dexterity; yet this may be done in a very satisfactory manner, by means of a fine lancet and needle, if they are placed in a drop of water: for their parts will then be separated with ease, and lie fair before the microscope, so that the stomach and other bowels may be plainly distinguished and examined.

We should always have ready for this purpose, little slips of glass, about the size of a slider, to place objects on occasionally; some of which slips should be made of green, blue, and other coloured glass, many objects being much more distinguishable when placed on one colour than on another. We should likewise be provided with glass tubes of all sizes, from the finest capillaries that can be blown, to a bore of half an inch diameter.

There is, perhaps, no better way of preserving transparent objects in general, than by placing them between clear isinglass in sliders: but opaque bodies, such as sands, seeds, woods, &c. require different management, and a collection of them should be prepared in the following manner.

Cut cards into small slips, about half an inch in length, and one tenth of an inch in breadth: wet them half their length with a strong but very transparent gum-water, and with that stick on your object. As the spots of cards are red and black, by making your slips of such spots, you will obtain a contrast to objects of almost any colour; and by fixing black things on the white, white on the black, blue or green on the red or white, and all other coloured objects on slips most contrary to themselves, they will be shewn to the best advantage. These slips are intended chiefly for the microscope for opaque objects, to be applied between the nippers: but they will also be proper for any other microscope that can shew opaque bodies. A little square box should be contrived to keep these slips in, with a number of very shallow holes in it just big enough to hold them. If such holes were cut through that pasteboard of which the covers of books are made, exactly fitted to the box, and a paper pasted on one side of it to serve for a bottom to it, three or four such pasteboards stowed with objects might lie upon one another in same box, and contain 100 or more

slips; with objects fastened on them, always ready for examination. It will not be found amiss to provide some slips larger than others, for the reception of different sized objects. But this will, perhaps, be better understood by an inspection of fig. 3. The box should likewise be furnished with a pair of pliers, to take up and adjust the slips, and therefore a convenient place is contrived therein to hold them, as is shewn in the figure.

There is no advantage in examining any object with a greater magnifier than what shews the same distinctly; and therefore, if you can see it well with the third or fourth glass, never use the first or second; for the less a glass magnifies, the better light you will have, the easier you can manage the object, and the clearer it will appear. It is much to be doubted, whether the true colours of objects can be judged of when seen through the greatest magnifiers: for as the pores or interstices of an object must be enlarged according to the magnifying power of the glass made use of, and the component particles of matter must by the same means appear separated many thousands of times farther than they do to the naked eye, their reflections of the rays of light will probably be different, and exhibit different colours. And indeed the variety of colouring which some objects appear dressed in, may serve as a proof of this.

The motions of living creatures themselves, or of the fluids contained within them, as seen through the microscope, are likewise not to be determined without due consideration: for, as the moving body, and the space wherein it moves, are magnified, the motion must probably be so too; and therefore that rapidity wherewith the blood seems to pass along through the vessels of small animals must be judged of accordingly.

§ 15. Dollond's Achromatic Telescope.

Mr Dollond's telescopes are of two kinds. 1. Those in which only the eye-piece slides, so as to be drawn out as far as is necessary for procuring distinct vision. Of this form are all the larger instruments; which are therefore generally fixed upon a stand, for viewing objects with greater steadiness.—2. Those which are composed of several sliding tubes, for the convenience of being put into the pocket.

The usual method of making the sliding tubes of telescopes has been with paper covered with vellum; but as such tubes have been found liable to several inconveniences from being affected by the moisture of the air, they are now contrived to be made exceedingly thin of brass, and the outside of mahogany.

The sliding tubes are all made to stop, when drawn out to the proper length; so that, by applying one hand to the outside tube A, fig. 4. and the other hand to the end of the smallest tube B, the telescope may be, at one pull, drawn out to its whole length, as is represented by fig. 5; then any of the tubes may be slipped in a little while you look through, and the object rendered distinct to any light.

To make the tubes slide properly, they all pass thro' short springs or tubes, which are screwed in at a, b; and c, fig. 5. These springs may be unscrewed from the ends of the sliding tubes by means of the milled edges which project above the tubes, and the tubes taken from one another when required.

There

There are four convex eye-glasses to these telescopes, whose surfaces and focal-lengths are so proportioned as to render the field of view very large.—These eye-glasses are all contained in the smallest sliding tube; three of them may be seen by unscrewing the tube at *eee*; and the fourth, which is at the end of the tube, may be come at by unscrewing the spring at *c*.

These telescopes are of three different lengths and sizes, usually called 1 foot, 2 feet, and 3 feet.

Length when in Use.	Length when shut up.	Aperture of the Achromatic Object-glass.	Weight.
14 Inches.	5 Inches.	1,1 Inches.	6 Ounces.
28 ditto.	9 ditto.	1,6 ditto.	16 ditto.
40 ditto.	10 ditto.	2,0 ditto.	30 ditto.

The best achromatic telescopes which Mr Dollond has yet made, are those with a triple object-glass of about 45 inches focal distance, with an aperture of 3½ inches. Some of these magnify the diameters of objects 130 times, with great distinctness, and light sufficient for most astronomical purposes. When fitted (for terrestrial objects) with an eye-piece magnifying about 70 or 80 times, they give most agreeable vision.

The object-glass of one of these telescopes was found to have the following radii (in inches) of curvature for its different surfaces, beginning with that next the object, $26\frac{1}{2}$, $37\frac{1}{2}$, $19\frac{1}{2}$, $26\frac{1}{2}$, $26\frac{1}{2}$. But it does not appear that Mr Dollond and the best artists abide by a fixed rule in their constructions; for object-glasses of the same length and magnifying power, and made by the same artist, have different constructions of the object-glass. This may be expected, when we consider the variable nature of the flint-glass. It is probable, that these very fine object-glasses have been produced by trials *pro re nata* of different curvatures.

Till some method can be discovered of making flint glass free from veins, which differ in their refracting power, it is not probable that larger telescopes than those now mentioned will be produced.

§ 16. Of the Newtonian Reflecting Telescope.

FIG. 1. shews one of those telescopes made by the Hon. Samuel Molyneux, and presented by him to king John V. of Portugal. ABC represents a triangular board or table supported by the globe D, and by the annexed carvings and masks, and which serves for the basis or pedestal of the instrument. Upon occasion this board may be taken off by unscrewing three iron screws, the heads of which lie near the three volutes at the three corners. At E is represented a small key or handle which turns some wheel-work, concealed under the board of the table, and which serves to give an horizontal circular motion to the pillar F placed in the middle, and to the superincumbent tube HIKL. If this should ever be out of order by taking off the upper board, it may be rectified. At G is represented another handle which gives the tube its perpendicular motion; so that while the observer sits with his right side applied to the side of the table AC at the end C, by turning the two handles E and G, he can give the tube any required elevation or azimuth, and thereby follow the motion of the heavenly bodies very commodiously.

The telescope itself consists of two metalline specula and an eye-glass, which are to be duly placed in the tube HIKL left open at the end HL. The large concave spherical speculum *ik* is to be placed within the tube at IK; in which are fixed three stops, or bits of wood, against which the polished surface of the speculum being applied, the axis of reflection will fall exactly in the axis of the tube. In the brass plate which closes this end of the tube, there are three screws intended for holding the metal in this situation; but many cautions are requisite with regard to this metal and the placing of it. In the first place, it is never to be touched, but by screwing into the backside of it a handle *l*, which fits the hole therein. In the next place, great care must be taken not to breathe on it, or to expose it to damp air. If any thing of that kind happens, it must be wiped thoroughly dry with a linen cloth before a fire; and it may be sometimes in like manner cleaned with a rag wetted in spirit of wine; provided the spirit be not left to evaporate, for that would leave an humid sediment which would hurt the polish. In the third place, unless when in use, it should be constantly kept with its face downwards on a piece of plane glass made on purpose.

The speculum is a portion of a concave sphere whose diameter is about eight feet eight inches, and which of consequence collects the rays into a focus about 26 inches distant from its surface. The laws of reflection are such, that any error in the figure of this speculum will produce about six times as great an irregularity in the picture formed in its focus, as the like irregularity would cause in a common refracting telescope. It hath been found by experiment, that an error of less than 1000th part of an inch is capable of vitiating its figure; so that great care must be taken in placing the metal in the tube for use, against the three stops above-mentioned; and that the three screws at IK be gently screwed, only just sufficient to bear the metal truly against the stops; for the smallest excess of stress in the screws against the back of the metal may distort and very much damage its figure. There is also a piece of wood *m*, having a round hole *p* in it, and carrying a small brass arm *n*, which holds the other smaller speculum *z*, which is plane. This speculum must be always preserved from the air when out of use. When the telescope is to be used, the cover of the small speculum must first be taken off; then place it in the tube at the hole M, which exactly fits the above-said square piece. Press it in pretty tight and true; which, if duly performed, the centre of the small speculum will be placed in the axis of the large concave one, and will reflect the parallel rays which enter at the open end HL, to the round hole *p* in the said square piece, *n* which hole one of the two eye-glasses in its cell *q* is to be placed; and then the instrument is prepared for use. The observer is therefore to place himself at the side of the tube, and to look in at M, where he will see the images of the objects which lie at his left-hand. In taking out or putting in the little speculum at *z*, great care must be used to avoid shaking or bending the arm; for the smallest accident of that kind will certainly disorder its situation. There are three screws at the back, the middlemost of which fixes it to the arm *mn*; the other two only press upon the back, and serve to adjust

just its situation to an exact angle of 45° with the axis of the great speculum. There are two eye-glasses, whereof the one that hath the largest aperture being made use of, the instrument will magnify as much as a common refracting telescope of about 20 or 22 feet long; and with the eye-glass that hath the smallest apertures, it will magnify as much and as distinctly as one of 35 or 40 feet.

At P stands a round button of ivory; and at Q is represented a small pin of ivory, which may be seen with a small white thread fixed to it, at the end of the tube H. This thread at the other end is fixed in the inside of the tube; and towards the middle of it, it is wound once round the inward end of the ivory button P. From this disposition, by turning round the ivory button P, the whole slider of black ebony wood NO, with the small speculum and the eye-glass applied at M, may be made to approach to or recede from the large speculum at the other end IK: and by this means its true distance, and the distinct appearance of the object, must be found, for various distances of the same object, and for the various eyes of different observers; which variety in different persons, from the great magnifying power of the eye-glass in this instrument, will be considerably more sensible than in a refracting telescope. But the true distance of the specula will immediately be found in all cases, by turning this ivory pin P backwards and forwards very slowly and gently; and, for celestial objects, the true distance being once found for the observer's eye, a small mark may be made across the slider, and upon the edge of the tube, to bring it speedily, and without any difficulty, to its proper place at another time. By the little ivory pin at Q, the firing may be tightened or relaxed to make the slider NO move most easily as occasion requires. Either of the eye-glasses being applied in the cylindrical hole p , in the square piece up , may also be made to approach to or recede from the focus, by turning round the small tube q in which they are inserted, the outside whereof is wrought into a fine screw for that purpose. Distinct vision may also by that means be obtained for different eyes, without moving the whole slider NO.

RS represents a small refracting telescope, whose axis is parallel to the axis of the reflector. In its focus there are placed two cross-hairs, and its only use is to find out any object more readily by the reflector. The eye being applied at S, turn the two handles at E and G, till the point of the object to be viewed in the reflector falls exactly on the cross-hairs; then the eye applied at M to the reflector, will see the same object distinctly; with this caution, that as the whole instrument with its basis can easily be moved, the most convenient situation for the observer will be to keep the tube HI nearly at right angles to the side AC, and to sit with the side AC flat against his right side near C, as hath been already mentioned. And in finding the object at first with the small refracting telescope, it is most convenient to stand at the corner of the table C. The handle G, may be inserted at either side of the pillar F, as convenience shall require. At the small pillars TV, which support and hold the small telescope RS, there are some small screws near T, which being relaxed, the direction of the tube RS may be altered horizontally by pushing the tube with the hand sidewise, either way, as occasion requires, and then tightening the screws

again. And at V there are screws and a spring-piece of brass, which, being relaxed or tightened, will in like manner alter its elevation, so as to restore the parallelism of the tubes in case of any accident that may have disturbed them. In making observations, it will be found convenient not to touch the table, but only to move the handles, as the motions of the star or other celestial body direct; for in an instrument that magnifies so much, the least motion or trembling is magnified proportionably.

In this telescope Dr Smith takes notice of a remarkable deception; namely, that, when the reflector is compared with a refracting telescope of equal magnifying power, the observer always imagines that the latter has the advantage. For this he does not pretend to account, but looks upon it to be an optical deception common to all mankind.

§ 17. The Gregorian Reflecting Telescope.

This is represented, fig. 16. O is a three-footed plate pedestal of wood or metal, in the middle of which CCXXIX. is fastened, by means of the large screw R, the stand AB. On the top of this stand is fastened the plate CD, having in it a socket to receive the brass ball D. This plate is composed of two parts; and by means of the screws L, M, the socket is tightened or loosened on the ball, so that it can either allow it a free motion, or keep it firm in its place. This ball is fully shewn at fig. 17; and, with its stalk F, is soldered into the piece of brass FG, which is again fastened on the body of the telescope by means of the screws HI. The whole length of the telescope is represented by ab ; the eye-piece, or the part which contains the eye-glasses, by ar ; the other part, containing the specula, is represented by cb . Fig. 4. and 5. shew the proportional size of the two specula to one another. The larger is placed at c , in the same manner and with the same precautions as have been already mentioned with regard to the Newtonian telescope; the other is placed on a short arm within the tube, in such a manner, that it occupies exactly the middle of it: and by means of a rod $rpqmc$, having the upper end of it turned into a screw, the little speculum can be removed from the other, or brought nearer to it, as occasion requires. In the eye-piece, ar , are two eye-glasses, which receive the light reflected from the little speculum; and the eye being applied at a , the observer sees those objects which are placed directly before the mouth of the tube.

The following are the proportions of an excellent Gregorian telescope, made by Mr James Short of Edinburgh, which may serve as a model for calculating others of any given length.

	Inches.
Focal distance of the larger speculum	9.6
Its breadth or aperture	2.3
Focal distance of the lesser speculum	1.5
Its breadth	0.6
Breadth of the hole in the larger speculum	0.5
Distance between the lesser speculum and the next eye-glass	14.2
Distance between the two eye-glasses	2.4
Focal distance of the eye-glass next the metals	3.8
Focal distance of the eye-glass next the eye	1.1

This telescope was found by experiment to magnify

60 times in diameter, and to take in an angle of 19° to the naked eye; and of consequence the magnified angle was equivalent to 19° .

For finding the magnifying power of a telescope by experiment, Dr Smith tells us, that the following method was pursued by Mr Hawksbee, Mr Folkes, and Dr Jurin. Having fixed a paper circle of one inch diameter upon a wall, at the distance of 2674 inches from the eye-glass of the telescope, they viewed it in the telescope with one eye, while, with the other eye naked, they viewed two parallel lines drawn upon paper, 12 inches asunder, moving them gradually to and fro, till they appeared to touch two opposite points of the circle seen in the telescope; and then the perpendicular distance of the lines was found to be 132 inches. In this position of the objects, the angle at the eye made by the rays that came from the extremities of the diameter of the one-inch circle, was equal to the angle subtended at the other eye by the 12-inch interval of the parallel lines; and therefore the ratio of this angle to that which the said circle would subtend at the naked eye, viewing it at the said distance of 2674 inches, is the magnifying power of the telescope; and is compounded of the direct ratio of the subtenses of these angles, and the inverse ratio of the distances of the subtenses from the eye; that is, of 12 to 1, and of 2674 to 142: which make the ratio of 226 to 1, very nearly.

Supposing a larger paper circle had been placed at so great a distance, that its picture might have been formed by the speculum in its principal focus; the telescope would have magnified it more than our one-inch circle, in the ratio of the distance of this latter circle from the principal focus, to its distance from the centre of the sphere of the speculum: because the diameter of the picture of the remoter circle would have been greater, in this ratio, than that of the one-inch circle, supposing these circles to subtend the same angle at the centre of the speculum. But this ratio, in the present experiment, being only 2674 to 2671, gives only an inconsiderable increase to the magnifying power already determined.

Thus we have an easy and accurate method of examining the goodness of a telescope of any kind. First, by giving it the least eye-glass that will shew the new moon, or rather Jupiter and Saturn, with sufficient light and distinctness when the air is quiet and pure; and then by finding how much it magnifies by the method abovementioned. But if several telescopes of the same kind have nearly the same length, those are the best in their kind with which you can read a print at the greatest distance. That the reader may have some notion of the powers of telescopes in this way, we shall subjoin a short account of the effects of some reflectors made by Mr James Short of Edinburgh, as related by Mr Maclaurin.

With a reflecting telescope, of which the speculum was quick-silvered glass, and focal distance 15 inches, the Philosophical Transactions could easily be read at the distance of 230 feet; by another of the same dimensions, the Transactions could be read at 280 feet distance. By a telescope of the same kind, whose focal distance was nine inches, Mr Maclaurin read in the Transactions at the distance of 138 feet; and another much smaller print at the distance of 125 feet.

It is not mentioned whether these telescopes were of the Newtonian or Gregorian form; though it is most probable that they were of the former kind.

As the light produced by these glass speculums was very faint, Mr Short next applied himself to the construction of metallic ones, and the effects of these were vastly greater; but as they were of the Gregorian form, it is doubtful whether we are to ascribe their superiority entirely to the use of metalline speculums, or to the more advantageous construction of them. These telescopes had focal distances of two inches and 6-10ths; of four inches; six, nine, and 15 inches. By those of four inches, the satellites of Jupiter were seen very distinctly; and he could read the Philosophical Transactions at above 125 feet distance. By those of six inches focus, he read at 160 feet distance; by those of 9 inches, he read at 220 feet distance; and by those of 15 inches, he was able to read the Transactions at 500 feet distance. With these last he also several times saw the five satellites of Saturn. The effects of these 15-inch telescopes of Mr Short's therefore were equal to those of the best 17-foot refractors ever known; for it was thought wonderful that Cassini should observe all the satellites of Saturn with a 17-foot refracting telescope.

§ 18. The Solar Telescope.

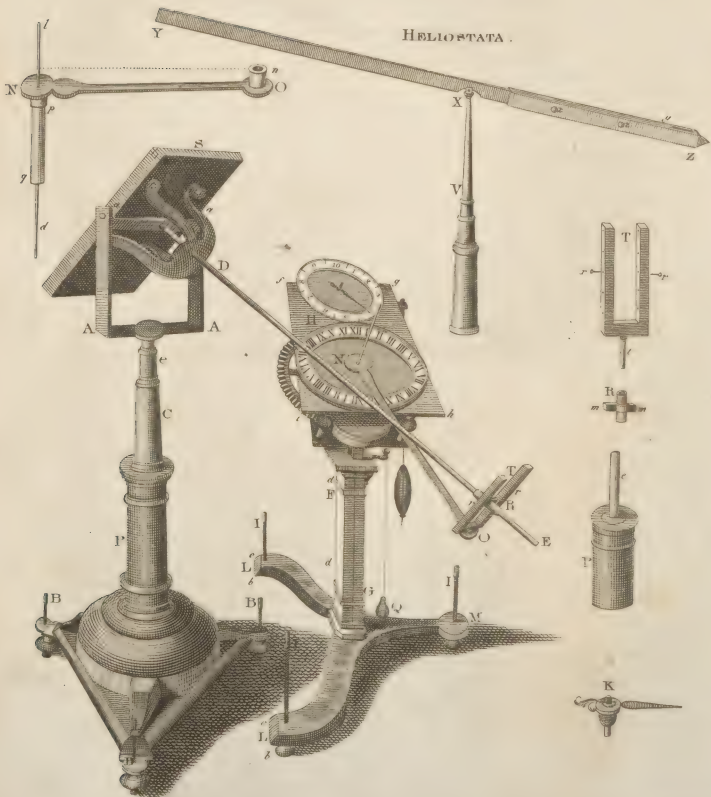
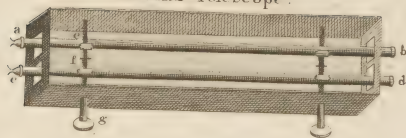
This instrument is of the nature of the camera obscura, and shews the image of the sun in a darkened room, as that of an insect is shewn by the solar microscope. AB, fig. 6. represents a part of the window-shutter of a darkened room; CD the frame, which, by means of a screw, contains the scioptical ball EF, in a hole of the said shutter adapted to its size. This ball is perforated with a hole *abcd*. Through the middle, on the side *bc*, is screwed into the said hole a piece of wood, and in that is screwed the end of a common refracting telescope GHIK, with its object-glass GH, and one eye-glass at IK; and the tube is drawn out to such a length, that the focus of each glass may fall near the same point. This being done, the telescope and ball are moved about in such a manner, as to receive the sunbeams perpendicularly on the lens GH, through the cylindric hole of the ball: by this glass they will be collected all in one circular spot *m*, which is the image of the sun. The lens IK is to be moved nearer to, or farther from, the said image *m*, as the distance at which the secondary image of the sun is to be formed requires, which is done by sliding the tube IKLM backward and forward in the tube LMNO. Then of the first image of the sun *m*, will be formed another, PQ, very large, luminous, and distinct.

In this manner the sun's face may be viewed at any time without offence to weak eyes; and whatever changes happen herein may be duly observed. The spots are here all of them conspicuous, and easy to be observed under all their circumstances of beginning to appear, increase, division of one into many, &c. By the solar telescope also we view an eclipse of the sun to the best advantage; as having it by this means in our power to represent the sun's disk as large as we please, and consequently to render the eclipse proportionably conspicuous. Also the circle of the sun's disk may be so divided by lines and circles drawn thereon, that the quantity of eclipse, estimated in digits, may

this

OPTICS.
Fig. 1.
Binocular Telescope.

Plate CCXXIV.



this way be most exactly determined; also the moments of the beginning, middle, and end of it, for determining the longitude of the place. The transits of Mercury and Venus over the sun are thus also beautifully represented, and the planets appear very round, black, and well-defined. Their comparative diameters with that of the sun may also be thus observed, the times of ingress and egress, &c. better than by any other method hitherto invented.

By the solar telescope the clouds are most beautifully represented passing before the sun, according to their various degrees of rarity or density; but these, Mr Martin says, are best observed by the camera obscura. He takes notice of an unusual phenomenon which he once observed in looking at the image of the sun by this instrument. The window looked towards the west, and the spire of Chichester cathedral was directly before it at the distance of about 50 or 60 yards. The images of the sun and spire were very large, being made by a lens of 12 feet focal distance, and it was very agreeable to observe the manner in which the sun was for some time eclipsed by the spire. Once, as he observed the occultation of the sun behind the spire, just as the disc disappeared, he saw several small, bright, round balls, running towards the sun from the dark part of the room, even to the distance of 20 inches. Their motion was a little irregular, but rectilinear, and seemed accelerated as they approached the sun. These luminous globules also appeared on the other side of the spire, and preceded the sun, running out into the dark room, sometimes more, sometimes less together, in the same manner as they followed the sun at its occultation. "They appeared, says he, to be in general about $\frac{1}{8}$ of an inch in diameter; and therefore must have been very large luminous globes in some part of the heavens, whose light was extinguished by that of the sun, so that they appeared not in open day-light; but whether of the meteor kind, or what sort of bodies they might be, I could not conjecture."

§ 19. *The Heliostat.*

THE use of this machine is to take off the inconveniences which arise from the motion of the earth, in making experiments on the solar light. By this motion it happens, that the image of the sun formed by the solar telescope can never be steady, but continually shifts its place on the screen upon which it is thrown; and the like may be said of the solar microscope. Any contrivance therefore by which this apparent motion can be prevented, and the light of the sun fixed upon any particular spot, or in one certain direction, must certainly be of the highest utility. The heliostat answers the purpose completely; and is an invention of Dr Gravesande, who gives the following description of it.

"This machine consists of two principal parts, each of which consists of many smaller parts. The first is a plane metallic speculum, supported by a stand; the other is a clock, which directs the speculum.

"We make use of a metallic speculum, because there is a double reflection in a glass one. The magnitude and figure of it are not material; mine is rectangular, four inches long and three broad.

"This is put into a wooden frame, which is surrounded with wooden rulers, cut in, whereby the speculum is retained.

"To sustain this, without hindering its motion, to Plate the said wooden frame, behind, is applied the brass plate *aa*, whose ends, being bent, are fastened to the wood sidewise. Fig. 2.

"This speculum *S* is suspended by the handle *AA*, small screws being put through holes in the end of it, which go into the ends *a, a*, of the said frame, and whose parts, which are in the holes of the handle, are cylindrical, so that the speculum turns freely upon its axis, which, if it were made sensible, would pass along the surface of the speculum.

"The handle is joined to the cylinder *C*, whose axis, if it were continued, would concur with the middle point of the said axis of the revolution of the speculum.

"To the same point answers the tail *DE*, which is joined perpendicularly to the hind part of the speculum. This tail is cylindrical; and is made of a brass wire, which is straight, firm, and whose diameter is about a sixth part of an inch.

"The cylinder *C* is put upon the wooden stand *P*, whose upper part is represented by itself: whilst this is done, the iron cylinder *c*, whose surface is smooth, goes into a cavity in the cylinder *C*, which is of copper; by which means this turns freely about its axis, so that, by the motion of the tail *DE*, the position of the speculum is very easily altered as you please.

"This is raised and depressed, by means of the three brass screws *B, B, B*, which are turned with a key, and go through a plate of the same metal, which is applied to the bottom of the stand for that purpose; and which stands out in three places, to receive the screws.

"If the speculum is to be raised higher, as may easily be done, we put the speculum together with its stand, upon a small board, which has low feet, and is made for that purpose.

"The other part of the machine is a clock, as has been said above. This is represented at *H*; the index performs its revolution in 24 hours.

"The plane of the clock is inclined to the horizon, according to the inclination of the equator in the place where the machine is made use of; that is, in this our city of Leyden is $37^{\circ} 49'$.

"But this machine may be made use of in other places, whose latitudes differ one or two degrees from this place, as will appear.

"The clock is sustained by the copper pillar *FG*; this consists of two parts, which are joined by the screws *d, d*, between which, as in a sheath, is moved an iron plate, in the middle of which there is a slit, through which the said screws *d, d*, pass. This plate is joined fast to the lower plate of the clock itself, which is raised and depressed by this method, and fastened by the screws *d, d*. It may also be raised higher by the screws *I, I, I*, which go thro' the thick copper plate *LLM*, upon which the pillar *FG* stands.

The extreme parts of this plate *L, L*, are terminated in such manner, that *bc* and *cb* make one right line, through which we suppose a vertical plane to pass: this will

will be perpendicular to the horizontal lines, which may be drawn on the plane of the clock; such as are *fg, bi*.

"The machine is so ordered, that the plane of the clock may have the inclination beforementioned, when the plane LLM is horizontal; in which situation it is easily placed by means of the screws I, I, I, by help of the plumb-line Q, whose point should answer to the point *o*, which is marked upon the surface LLM.

"If the machine were to be used in another place, whose latitude differed from that for which the machine was constructed, another point, as *o*, would be marked, in which case the plane LLM would be inclined to the horizon.

"The axis of the wheel, which moves the index, is pretty thick, and is perforated cylindrically; but the cavity inclines a little to a conical figure, for towards the bottom it is somewhat narrower.

"The index itself is represented at ON. This is of brass, and its tail *pq* exactly fills the cavity mentioned last, into which it is thrust tight, that it may flick, and that the wheel may carry the index with it as it moves; whose situation may yet be altered, and set to any hour.

"This tail has also a cylindrical hole; and through this passes the small brass wire *ld*, which remains in any situation, whilst it is raised or depressed.

"At the end O of the index there is a small cylinder *n*, which is perforated cylindrically.

"The length of the index is measured in the line, perpendicular to *ld*, drawn from the axis of the cylinder *n* to the axis of the wire *ld*. In my machine this length is six inches.

"The iron tail *l* of the piece T goes into the cavity of the cylinder *n*; this tail exactly fills the cavity, but yet moves freely in it.

"Between the legs of the piece T, the small pipe R may be suspended at different heights, thro' which the tail DE of the speculum may be moved freely, which fills the pipe very exactly. This small pipe is suspended, as was said of the speculum. The small

21 Mar.	1 Mar.	21 Fe.	11 Fe.
o.	8.	17.	32.
21 Sept.	11 Oct.	21 Oc.	1 No.

"On the opposite side of the ruler, there is also whose divisions are contained in this second small table.

21 Mar.	11 Ap.	21 Ap.	1 May
o.	11.	22.	36.
21 Sep.	1 Sep.	21 Au.	11 Au.

"These things being thus ordered; to fix the machine, it is put upon a plane that is horizontal, or nearly so.

"First we join the placer to the stand P, which we raise as much as is necessary, that the ruler YZ being reduced to a just length, which we turn at pleasure, and incline in every respect, that is with respect to the place and direction, may agree to the sun's ray, which we undertake to fix.

"We fo order the other part of the machine, that the lines *bc, bc*, may agree to a meridian line which has been drawn on the plane; and it is so disposed by means of the screws I, I, I, that the plumb-line Q may answer to the point *a*.

screws *r, r*, pass through the said legs, and the ends of them go into the parts *m, m*, of the pipe, and remain there: then the pipe turns freely about the axis which passes through *mm*; for the parts of the small screws are cylindrical, which answer to the holes in the legs of the piece T.

"When the machine is to be fixed, we make use of another machine, which we shall call a *placer*.

"The cylinder C, together with its speculum, is removed from the stand P, upon which is placed the brass pillar VX. This sticks tighter to *e* than the cylinder C, that the pillar may keep its place, whilst the machine is settled.

"Upon the head X the ruler YZ moves round a centre, so that it may be inclined to the horizon as you please, and keep its position. The length of the arm YX is determined at pleasure. The arm XZ is of a peculiar construction, and a certain length.

"To the said ruler, which is not extended beyond *y*, there are applied two others, as *xZ*, between which the first is inclosed: these are joined at Z, and also cohere by means of the screws *z, z*, which pass thro' a slit in the first ruler. On this ruler is marked the small line *vz*, whose length is equal to nine hundredth-parts of the length of the index, and which is divided in the manner which will be mentioned presently.

"The arm XZ is equal to the length of the index, if it be measured between the centre of motion at X and the end Z, when the end *x* of the outward ruler agrees to *v*, where the divisions of the small line *vz* begin.

"The divisions of this small line are unequal, and determine the length of the arm at different times of the year, by applying *x* to the division which answers to the day in which the machine is used.

"But in order to mark the divisions, we suppose the length of the arm to be divided into 1000 equal parts, that is, *vz* into 90 equal parts; but the distances from the point *v* are set down in the following small table.

1 Fe.	21 Ja.	11 Ja.	21 Dec.
47.	64.	77.	90.
11 No.	21 No.	1 Dec.	21 Dec.

drawn a small line, which accurately answers to *vz*, table.

11 May	21 May	1 Jun.	21 Jun.
51.	66.	79.	90.
1 Au.	21 Jul.	11 Jul.	21 Jun.

"The index NO is turned, that the sun's rays may pass directly thro' the pipe R, which is turned and inclined, as is required. The brass wire *ld* is then raised or depressed, that the shadow of the end of it may pass through the middle of the pipe.

"This whole part is moved to the placer, which is ordered as has been said before. But the clock is so moved towards the placer, and raised, that the end *l* of the brass wire *lk* may agree to the end Z of the ruler YZ.

"We must continually have regard to the plummet Q, that it may always answer to the point *a*; we must also take care, that after the clock is moved, the sun's rays and the shadow of the point *l* may pass thro' the

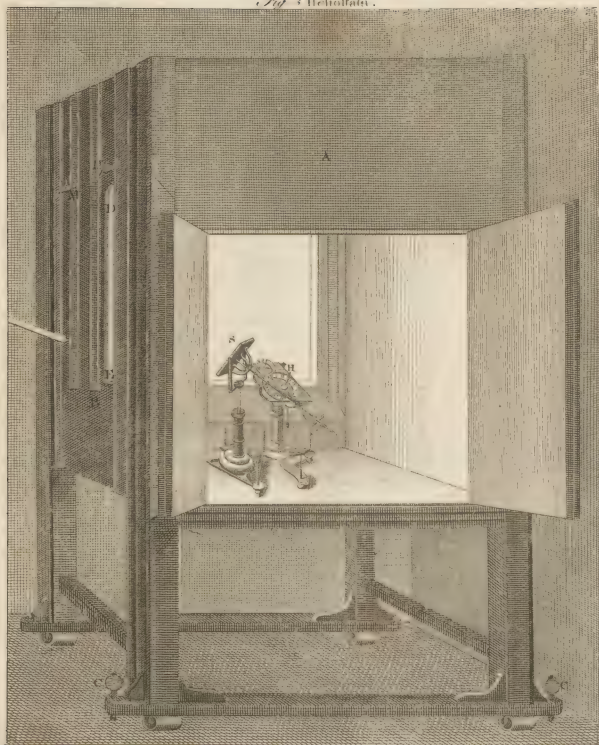


Fig. 1

Fig. 2

Fig. 3

Fig. 4

A. Bell Sculp^t

the small pipe R as before, that the position with respect to the meridian may not be disturbed.

"The pillar VX with its ruler YZ is removed, the stand P being left in its place, on which the cylinder C with its speculum is put. The piece T is taken out of its place, that the tail DE of the speculum may be put thro' the pipe R; when the piece T is put in the same place again, every thing is ready.

"Then the rays reflected from the middle of the speculum, to which all the other rays, reflected from the speculum, are parallel, agree, as to place and direction, with the position which the ruler of the plazer had; and whilst the tail of the speculum is moved, as the clock moves, whose index follows the sun, its situation is altered with respect to the sun; but the ray, reflected from the middle point of the speculum, remains fixed.

"If the index NO being taken away, we substitute the index K, the machine may be used as a common clock.

"The experiments concerning light must be made in the dark; for this reason the machine, when made use of in the experiments, must be shut up in a box or case.

"This case is represented at A; it stands upon feet that have rollers joined to them, that it may be easily moved. It is open at one end, which end is moved to a window, through which the sun's rays come freely to the speculum.

"But the box is every way larger than the window, that, by being applied close to the wall, the light may be hindered from entering into the chamber; to this end, the box is moved as near the wall as possible, and the screws C, C, which are fastened to the fore-feet, are turned till they touch the ground.

"The door in my machine is opposite to the window; it might have been otherwise disposed. We transmit the rays through the fore part B; we make choice of this, by reason of the make of the place in which the experiments concerning light were made. In this part there are two apertures three inches broad, and about 18 inches high, one of which is represented open at DE.

"These are closed on the outside by pieces of wood, which are moveable between wooden rulers. Each piece serves either aperture, that they may be changed. One of them F is three feet long, and has a hole in its middle. The aperture *ab* is five inches long, and two broad.

"This is closed by the copper plate GH, in which there are two holes, *c, d*; the diameter of that is two thirds of an inch, the diameter of this is less. These holes are stopped by the plates I and K, which are applied to the first plate GH, and are moveable about the centres *i* and *k*: the magnitudes of the holes may also be varied, by turning the last plates, as the figure shews.

"The board F is hollowed behind, in order to receive the object-glass of a telescope of 16, 20 or 25 feet, according to the magnitude of the place in which the experiments are made; the centre of this glass ought to answer to the centre of the hole *c*.

"This board F is pretty long; the holes of the small plate may answer to any part of the aperture of the box, the other part of the aperture remaining shut.

For this reason the second board is shorter; it is sufficient if the aperture be closed with this. These boards are fastened by the screws M, M.

"We have shewn how the box is to be applied to the window; but this cannot be done thus, if we would make the experiments in the hours in which the sun's rays enter the window very obliquely. In this case, that the rays may come to the speculum, the box must answer to a part of the window only; the remaining part is closed any other way: I make use of a curtain to exclude all the sun's rays."

§ 20. Equatorial Telescope, or Portable Observatory.

The Equatorial Telescope was contrived by Mr James Short; and consists of two circular planes or plates AA, supported upon four pillars; and these again supported by a cross-foot or pedestal moveable at each end by the four screws BBBB. The two circular plates AA are moveable, the one above the other, and called the *horizontal plates*, as representing the horizon of the place; and upon the upper one are placed two spirit-levels, to render them at all times horizontal: these levels are fixed at right angles to each other. The upper plate is moved by a handle C which is called the *horizontal handle*, and is divided into 360°, and has a nonius index divided into every three minutes.—Above this horizontal plate is a femicircle DD; divided into twice 90°, which is called the *meridian femicircle*, as representing the meridian of the place; and is moved by a handle E, called the *meridian handle*; and has a nonius index divided into every three minutes. Above this meridian femicircle is fastened a circular plate, upon which are placed two other circular plates FF, moveable the one upon the other, and which are called the *equatorial plates*; one of them, representing the plane of the equator, is divided into twice twelve hours, and these subdivided into every ten minutes of time. This plane is moved by a handle G, called the *equatorial handle*, and has a nonius index for shewing every minute. Above this equatorial plate there is a femicircle HH, which is called the *declination femicircle*, as representing the half of a circle of declination, or horary circle, and is divided into twice 90°, being moved by the handle K, which is called the *declination handle*. It has also a nonius index, for subdividing into every three minutes. Above this declination femicircle is fastened a reflecting telescope LL, the focal length of its great speculum being 18 inches.

In order to adjust this instrument for observation, the first thing to be done is to make the horizontal plates level by means of the two spirit-levels, and the four screws in the cross pedestal. This being done, you move the meridian femicircle, by means of the meridian handle, so as to raise the equatorial plates to the elevation of the equator in the place, which is equal to the complement of the latitude, and which, if not known, may also be found by this instrument. By this telescope the following problems may be solved.

To find the Hour of the Day, and Meridian of the Place. First find, from the astronomical tables, the sun's declination for the day, and for that particular time of the day; then set the declination femicircle to the declination of the sun, taking particular notice whether it is north or south, and set the declination femicircle

circle accordingly. You then turn about the horizontal handle and the equatorial handle, both at the same time, till you find the sun precisely concentric with the field of the telescope. If you have a clock or watch at hand, mark that instant of time; and by looking upon the equatorial plate and nonius index, you will find the hour and minute of the day, which comparing with the time shewn by the clock or watch, shews how much either of them differ from the sun.

In order to find the meridian of the place, and consequently to have a mark by which you may always know your meridian again, you first move the equatorial plate by means of the equatorial handle, till the meridian of the plate, or hour-line of 12, is in the middle of the nonius index; and then by turning about the declination handle till the telescope comes down to the horizon, you observe the place or point which is then in the middle of the field of the telescope, and a supposed line drawn from the centre of this field to that point in the horizon, in your meridian line. The best time of the day for making this observation for finding your meridian, is about three hours before noon, or as much after it. The meridian of the place may be found by this method so exactly, that it will not differ from the true meridian above 10" in time; and if a proper allowance be made for refraction at the time of observation, it will be still more exact. The line thus found will be of use afterwards, as being the foundation of all astronomical observations.

To find a *Star or Planet in the Day-time*. The instrument remaining rectified as already directed, you set the declination semicircle to the declination of the star or planet you want to see; and then you set the equatorial plate to the right ascension of the star or planet at that time; and looking through the telescope, you will see the star or planet: and having once got it into the field of the telescope, you cannot lose it again; for as the diurnal motion of a star is parallel to the equator, by moving the equatorial handle so as to follow it, you will at any time, while it is above the horizon, recover it, if it is gone out of the field.

The easiest method for seeing a star or planet in the day-time is this: Your instrument being adjusted as before directed, you bring the telescope down, so as to look directly at your meridian mark; and then you set it to the declination and right ascension, as before mentioned. By this instrument most of the stars of the first and second magnitude have been seen even at noon-day, when the sun was shining very bright; as also Mercury, Venus, and Jupiter. Saturn and Mars are not so easily seen, on account of the faintness of their light, except when the sun is but a few hours above the horizon.

And in the same manner, in the night-time, when you can see a star, planet, or any new phenomenon, such as a comet, you may find its declination and right ascension immediately, by turning about the equatorial handle and declination handle, till you see the object: and then, looking upon the equatorial plate, you find its right ascension in time; and you find, upon the declination semicircle, its declination in degrees and minutes.

In order to have the other uses of this instrument, you must make the equatorial plates become parallel

to the horizontal plates; and then this telescope becomes an *equal altitudes* instrument, a *transit instrument*, a *theodolite*, a *quadrant*, an *azimuth instrument*, and a *level*. The method of applying it to these different purposes is obvious. As there is also a box with a magnetic needle fastened in the lower plate of this instrument, by it you may adjust it nearly in the meridian, and by it you may also find the variation of the needle. If you set the horizontal meridian and the equatorial meridian in the middle of their nonius indexes, and direct your telescope to your meridian mark, you observe how many degrees from the meridian of the box the needle points at, and this distance or difference is the variation of the needle.

§ 21. The Binocular Telescope.

The *binocular telescope* consists of two distinct telescopes severally directed from each eye to the same object, and combined together in the following manner. In fig. 1. *ab* and *cd* are two equal telescopes laid in a long box, nearly parallel to each other; the intervals between the eye-stops *a* and *c* being equal to the interval of the pupils, and that of the centres of the object-glasses somewhat less than the other. Both ends of the telescopes pass through oblong slits in both ends of the box; and the interval between them may be widened or contracted at either end by a long screw-pin laid over each end of both the telescopes; the threads of each half of the screws being wrought contrary ways, and called a *right* and *left handed screw*. For these halves being put through two nuts *e, f*, fixed to the upper sides of the telescopes, it comes to pass, that by turning the screw-pin one way, the two telescopes will accede to, and the other way they will recede from, each other; till, by one of these screw-pins, the interval between the eye-stops *a, c*, becomes equal to the intervals of the pupils of the observer; and by the other, the axes of the telescope become directed to the same object; which will be known exactly if there are cross hairs in the focus of each telescope, and even without them. For before this position is obtained, the objects will appear double, and afterwards single; and a much stronger and brighter appearance of the object will be obtained than by a single telescope.—There are other contrivances, besides that of a two-handed screw, by which the telescopes may be made to approach to or recede from each other. To exclude all useless and hurtful light from the eyes, the eye-stops are made hollow and very broad, to cover some part of the temples; and their inner parts are cut away, to admit the upper part of the nose between them. Two reflecting telescopes, as well as two refracting ones, might be combined into a binocular telescope; and, for the purpose of celestial discoveries, promises to be a very useful instrument.

§ 22. Of making Celestial Observations.

In the day-time there is little difficulty in finding the exact time of the transit of such stars as are capable of being discovered by the telescope over the middle of the field, because the cross-hairs placed in the focus of the object-glass receive a sufficient quantity of light to render them visible. But, in the night-time, these hairs are not visible, and therefore the observer

server hath not any mark to direct him: hence astronomers are obliged to enlighten the cross-hairs artificially, in order to render them visible, and this without letting the luminous body interfere with the object which they intend to view; and, for doing this, two ways are proposed.

1. The object-glass of the telescope may be obliquely enlightened by placing a candle near to it in an oblique situation, so that its smoke or flame may not interfere with the object. But if the object-glass should happen to be pretty deep in the tube, it cannot be sufficiently enlightened by this means; and besides, if the telescope is above six feet long, there will be a considerable difficulty in throwing a sufficient quantity of light upon the cross hairs.

2. By some an opening is made in the side of the tube near the focus of the object-glass, through which the cross hairs are illuminated by means of a candle. But this method also is attended with inconveniences; for the observer is incommoded by the light being so near his eyes, and the hairs themselves become liable to accidents through their exposed situation. An error also attends this method; which is, that, according to the position of the light illuminating these hairs, they will appear in different situations. For example, when the horizontal hair is enlightened above, we perceive a luminous line which may be taken for the hair itself, and which appears at its upper superficies. On the other hand, when the hair is enlightened underneath, the luminous line will appear at the under surface of it; and the error will be the diameter of the hair, which often amounts to more than six seconds. M. de la Hire, however, found a remedy for this inconvenience. He often observed, that in moon-shine nights, when the weather was a little foggy, the cross hairs were distinctly seen; but when the heavens were serene, they could scarcely be perceived: he therefore covered with a piece of gauze, or fine silk-crape, that end of the tube next the object-glass; and this method succeeded so well, that a link placed at a good distance from the telescope so enlightened the crape, that the cross-hairs distinctly appeared, and the light of the stars was by no means obscured.

In making solar observations, a smoked glass must be used for preserving the eyes; and which may be thus prepared. Take two equal and well polished round pieces of flat glass; upon the surface of one of which, all round its limb, glue a pasteboard ring; then put the other piece of glass into the smoke of a lamp, taking it several times out, and putting it in again, till the heat should break it, until the smoke be so thick, that the lamp can scarcely be seen through it: but the smoke must not be all over of the same thickness, that so a place may be chosen answering to the splendour of the sun. This being done, the glass, thus blackened, must be glued to the pasteboard ring abovementioned, with its black side next to the other glass, that the smoke may not be rubbed off.

There are two kinds of observations relating to the stars: one is, when they are in the meridian; the other, when they are in vertical circles. If the position of the meridian be known, the quadrant with which the observation is made, must be placed in the plane of that circle, and then the meridian altitudes are easily observed by means of the plumb-line. The meridian

altitude of a star may likewise be had by a pendulum clock, if the exact time of the star's passing by the meridian be known. It must be observed, however, that stars have the same altitude a minute before and after their passing the meridian, if they be not in or near the zenith; but if they be, their altitudes must be taken every minute when they are in or near the meridian, and then their greatest or least altitudes will be those in question. The position of a given vertical circle must be found by the following method. 1. The quadrant and telescope remaining in the same situation wherein it was when the altitude of a star, together with the time of its passage by the intersection of the cross hairs in the focus of the object-glass, was taken, we observe the time when the sun, or some fixed star, whose longitude and latitude is known, arrives to the vertical hair in the telescope; and from thence the position of the said vertical circle will be had, and also the observed star's true place. But if the sun, or some other star, does not pass by the mouth of the tube; and if a meridian line be otherwise well drawn upon a floor, or very level ground, in the place of observation; a plumb-line must be suspended from a fixed place, at about 18 or 20 feet from the quadrant; under which a mark must be made on the floor, in a right line with the plumb-line. You must next put a thin piece of brass or pasteboard very near the object-glass, in the middle of which there is a slit vertically placed, and passing through the centre of the circular figure of the object-glass. Now, by means of this slit, the before-mentioned plumb-line may be perceived through the telescope, which before could not be seen, because of its nearness. Then the plumb-line must be removed and suspended, so that it be perceived in a right line with the vertical hair in the focus of the object-glass, and a point marked on the floor directly under it. And if a right-line be drawn through this point, and that marked under the plumb-line before it was removed, the said line will meet the meridian drawn upon the floor; and so we shall have the position of the vertical circle in which the observed star is, with respect to the meridian, the angle whereof may be measured in assuming known lengths upon the two lines from the point of concurrence; for if, through the extremities of these known lengths, a line or bafe be drawn, we shall have a triangle, whose three sides being known, the angle at the vertex may be found, which will be the angle made by the vertical circle and meridian.

Under the article QUADRANT, is shewn the proper method of fixing that instrument exactly in the meridian: but where the observer has no convenience of this kind, it will be proper to use a portable quadrant; by means of which the altitude of a star must be observed a little before its passage over the meridian, every minute, if possible, until its greatest or least altitude be had; by which means, though we have not the true position of the meridian, yet we know the meridian altitude of the star. But although this method is very good, yet if a star passes by the meridian near the zenith, we cannot have its meridian altitude by repeated observations every minute, unless by chance; because in every minute of an hour, the altitude augments 15 minutes of a degree; and in these kind of observations, the inconvenient situation of the observer, the variation of the star's azimuth several de-

greens in a little time, the alteration that the instrument must have, and the difficulty in well replacing it vertically again, hinders our making observations oftener than once in four minutes, during which time the difference in the star's altitude will be one degree. In these cases, therefore, it will be better to have the true position of the meridian, in order to place the instrument exactly in it; or to move it so that one may observe the altitude of the star the moment it passes the meridian.

The refraction may be found in the following manner. Having the meridian altitudes, and the declination of two stars of nearly equal altitudes, find also, by the directions already given, the apparent meridian altitude of some star near the pole; and if the complement of that star's declination be added thereto or taken therefrom, we shall have the apparent height of the pole. After the same manner may the apparent height of the equator be found by means of the meridian altitude of some star near it, and adding or subtracting its declination. Then these heights of the pole and equator being added together, they will always make more than 90 degrees, because both of them are raised by the refraction: but taking 90 degrees from this sum, the remainder will be double the refraction of either of the stars observed at the same height; and therefore taking this refraction from the apparent height of the pole, or equator, we shall have their true altitude.

To illustrate this: Suppose the meridian altitude of a star observed below the north pole to be $30^{\circ} 15'$, and complement of its declination 5° ; whence the apparent height of the pole will be $35^{\circ} 15'$. Also let the apparent meridian altitude of some other star, observed near the equator, be $30^{\circ} 40'$, and its declination $40^{\circ} 9'$; whence the apparent height of the equator will be $54^{\circ} 49'$. Therefore the sum of the heights of the pole and equator thus found will be $90^{\circ} 4'$; from which subtracting 90° , there remain $4'$, which is double the refraction at $30^{\circ} 28'$ of altitude, which is about the middle of the heights found. Therefore at the altitude of $30^{\circ} 15'$, the refraction will be somewhat above $2'$, viz. $2' 1''$; and at the altitude of $30^{\circ} 40'$, the refraction will be $1' 59''$. Lastly, if $2' 1''$ be taken from the apparent height of the pole, $35' 15''$, the remainder $35^{\circ} 12' 59''$ will be the true height of the pole; and so the true height of the equator will be $54^{\circ} 47' 1''$, as being the complement of height of the pole to 90° . The refraction and height of the pole found according to this way, will be so much the more exact as the height of the stars is greater; for if the difference of the altitudes of the stars should be even 2° when their altitudes are above 30° , we may by this method have the refraction and the true height of the pole; because, in this case, the difference of refraction in altitudes differing only two degrees is not perceptible.

The quantity of refraction may also be found by the observation of one star only, whose meridian altitude is 90° , or a little less: for the height of the pole or equator above the place of observation being otherwise known, we shall have the star's true declination by its meridian altitude; because refractions near the zenith are insensible. Now, if we observe by a pendulum the exact times when the said star comes to every

degree of altitude, as also the time of its passage by the meridian, which may be known by the equal altitudes of the star being east and west, the refraction may be found by the solution of a case in spherical trigonometry: for here, in a spherical triangle, we have the distance between the pole and zenith, the complement of the star's declination, and the angle comprehended by the arcs abovementioned; namely, the difference of mean time between the passage of the star by the meridian and its place, converted into degrees and minutes, to which must be added the proper proportional part of the mean motion of the sun in the proportion of $59' 8''$ per day; therefore the true arc of the vertical circle between the zenith and true place of the star may be had. But the apparent arc of the altitude of the star is had by observation, and the difference of these arcs will be the quantity of refraction at the height of the star.

To find the time of the equinox and solstice by observation, we must proceed in the following manner. Having found the height of the equator, the refraction, and the sun's parallax at the same altitude, it will not be difficult afterwards to find the time in which the centre of the sun is in the equator; for if, from the apparent meridian altitude of the sun's centre the same day that it comes to the equinox, be taken the convenient refraction, and then the parallax be added thereto, the true meridian altitude of the sun's centre will then be had. Now the difference of this altitude and the height of the equinoctial will shew the true time of the true equinox before or after noon: and if the sum of the seconds of that difference be divided by 59, the quotient will shew the hours and fractions which must be added to or subtracted from the true hour of noon to have the time of the true equinox. The hours of the quotient must be added to the time of noon, if the meridian altitude of the sun be less than the height of the equator about the time of the vernal equinox; but they must be subtracted, if it be found greater. We must proceed in a contrary manner when the sun is near the autumnal equinox.

The solstices are found with much more difficulty; for one observation only is not sufficient, because about this time the difference between the meridian altitudes in one day and the next succeeding day is almost insensible. The exact meridian altitude of the sun must therefore be taken for 12 or 15 days before the solstice, and as many after, that so one may find the same meridian angle by little and little; to the end that, by the proportional parts of the alteration of the sun's meridian altitude, we may the more exactly find the time when the sun's altitude is the same before and after the solstice, being in the same parallel to the equator. Now, having found the time elapsed between both situations of the sun, you must take half of it, and seek in the tables the true place of the sun at these three times. This being done, the difference of the extreme place of the sun must be added to the mean place, in order to have it with comparison to the extremes; but if the mean place found by calculation does not agree with the mean place found by comparison, you must take the difference, and add to the mean time, that which answers to that difference, if the mean time found by calculation be lesser; but, if greater, it must be subtracted, in order to have the time of the solstice.

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alice. Here it must be noticed, that an error of a few seconds in the observed altitude of the sun will make an alteration of an hour in the true time of the solstice; whence it is plain, than the true time of the solstice cannot be had but with instruments very well divided, and several very exact observations.

With regard to eclipses, the beginning, end, and total emersion may be estimated with sufficient exactness without telescopes; excepting the beginning and ending of lunar eclipses, where an error of one or two minutes may be made, because it is difficult to determine with certainty the extremity of the shadow. But the quantity of the eclipse, that is, the eclipsed portion of the sun and moon's disk, which is measured by digits, or the 12th part of the sun and moon's diameter, and minutes, or the 60th part of digits, cannot be well known without a telescope joined to some instrument. One method of observing them by the solar telescope hath been already described; but this applies only to eclipses of the sun, those of the moon not being discoverable by reason of the faintness of the light: for these therefore micrometers must be used, which are to be placed in the focus of the telescope, and of which various kinds are described under the article MICROMETER. The eclipses of the satellites of Jupiter are to be observed in the same manner, but require a better telescope than what is necessary for observing the eclipses of our moon.

It is here proper to take notice of the method of obviating a difficulty formerly taken notice of; namely, that in a serene night we often find the light of Jupiter and its satellites observed through the telescope to diminish by degrees, so that it is impossible to determine exactly the true times of the immersion and emersion of the satellites. This proceeds from the dew which falls upon the surface of the object-glass, and intercepts the light. A very fine remedy is, to make a tube of blotting paper, about two feet long, and of a sufficient bigness to go about the end of the tube of the telescope next to the object-glass, which will very effectually drink up the dew, and hinder it from coming to the object-glass; and by this means we may make our observations with sufficient exactness.

§ 15. *Telescopic Instruments for finding Time by observing when the Sun or any Star has equal Altitudes on each side of the Meridian.*

ONE of these instruments was made by Mr Roger Cotes, and was contrived by him for the purpose of regulating a pendulum-clock presented to the Royal Society by Sir Isaac Newton, to whom he sent the following description. "AB is a strong wooden axis about six feet in length: CD and DE on one side, EF and FG on the other, are pieces framed to each other and to the axis as firmly as was possible. Into the piece CD, and at the angle F, were fixed strong wooden pins nearly parallel to each other, and perpendicular to the plane CDEFG. PQ is the cylindrical brass tube of a five-foot telescope (belonging to our sextant;) this was well fastened with iron staples and screws to the piece of wood IKML, whose under plane surface is here represented as objected to view. Into this surface there was perpendicularly fixed a strong wooden pin N, which was designed to hang the upper end of

the telescope upon any of the pins in CD, whilst its lower end rested upon the pin F. Now, that the telescope might be taken off, and yet afterwards be again placed accurately in the same position, I ordered the edges IK and CD, which touched each other, to be rounded like the surface of a cylinder, as also the edge EF into which the pin F was fixed, and against which the cylindrical tube of the telescope rested, so that the contact in both places might be made in a point. Upon the same account the pins in CD were made a little hollow, as is represented at R; and the pin F was a frustum of a cone, that thereby the telescope might more surely touch the edges CD and EF. Into the two ends of the wooden axis were strongly fixed two pieces of well-tempered steel: that at the upper end A was a cylinder well turned, which moved in a collar, whose cavity, represented by S, was figured like two hollow and inverted frustums of cones joined together; the lower at B was a cone moving in a conical socket of a somewhat larger angle. This socket had liberty to be moved horizontally, and to be fixed in any position by two screws, which pressed against it sideways at right angles to each other. The instrument being thus prepared, I fixed a needle V, at the lower end of the wooden axis, whose point stood out from it about an inch; then suspending a fine plumb-line TVX from the upper end of the same axis, I altered the position of the instrument by the screws, until the plumb-line came to beat against the point of the needle in the whole revolution of the instrument, and there I fixed it as prepared for use."

So far Mr Cotes. The plumb-line or fine wire TVX was suspended by a loop T upon a brass pin that screwed into the top of the axis AB; a nick being filed round the pin to stay the loop from sliding out of it. Then by screwing the pin in or out, the plumb-line was brought to the same distance from the axis AB as the point of the needle is at V: which was fixed in the end of a thick wooden pin Y, not in the axis of it, but towards one side; so that by turning the pin round itself, in a hole bored through the axis AB, the needle's point might describe a small circle, and be brought to touch the plumb-line when parallel to the axis of motion of the wood AB.

Dr Smith gives the following description of an excellent instrument of this kind, in the noble collection of the right honourable the earl of Ilay. "It is made of all of brass, except a square steel axis *ab* 30 inches in length. To one side of the upper part of this axis there is fixed a small sextantal arch *cd* represented separately at E; its centre *a* being at the top of the axis *ab*. The telescope MN is also 30 inches long, and is fixed along the diameter of a semicircle of the same radius as the sextant, and concentric to it. The telescope with the semicircle being moveable about this centre upon the plane of the fixed sextant *acd*, may be fastened to it in any elevation by two nuts and screws *c, d*, fixed in the ends of the sextantal arch; a circular slit being made all along the limb of the semicircle for these screw-pins to slide in. Close under these arches, the axis *ab* is surrounded by a short cylinder *e*, about an inch in diameter, well turned and polished. The lower end of the axis is formed into a fine conical point *b*. The frame in which the axis turns, is a long hollow parallelopiped wanting two sides.

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Ilay's in-
strument.

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Mr Cotes's
instrument
described.Plate
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fig. 2.

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sides. Its other sides fg , are two brass plates, equal in length to the part be of the axis, and are screwed together edgeways. It has for its bases two equal plates b, i , four inches square. In the middle of the upper square there is a round hole large enough to receive the cylinder e , without touching it; and over this hole is fixed a triangular hole in another plate; one of whose sides is moveable by a screw, to make all the sides of the triangle touch the cylinder. Upon the lower square there lies a smaller plate i , with a fine centre-hole to receive the point b of the axis. This centre-plate is moveable sideways by two screws at right angles to each other, which, when the frame is firmly fixed into a niche of a free-stone pillar, will bring the axis ab exactly perpendicular to the horizon. This position is known by a spirit-level lm fixed at right angles to the axis above the cylinder, upon the side opposite to the semicircle. Along the top of the level there is a sliding pointer to be set to the end of the air-bubble; and when the position of the axis is so adjusted by the screws below, that the air-bubble keeps to the pointer for a whole revolution of the instrument; the axis ab is certainly perpendicular to the horizon; and then the line of sight through the telescope describes a circle of equal altitudes in the heavens. There are several of these circles described in the heavens, even when the telescope is fixed to the sextantal arch. For the round hole in its focus has five wires parallel to the horizon at equal intervals from one another, as at k ; and they are crossed at right angles in the middle by two other upright wires at a small distance from each other. The design of so many wires is to observe when the same star is successively covered by every one of the five, both in the east and west; so that the time of its passage over the meridian may be had more accurately, by taking a medium among all the observations. The distances between the five wires need be no greater than to afford time enough to write down the several observations, which must be taken when the star is between the perpendicular wires.

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instruments.

Time shewn by a clock may be called *mechanical*, to distinguish it from *solar* and *sidereal* time. By observing when a star has equal altitudes before and after its culmination or appulse to the meridian, we have the mechanical time of its culmination. Then by subtracting the sun's right ascension computed to this mechanical time, from the star's right ascension determined for the same time, we have the solar time of the star's culmination, and consequently the difference between the mechanical and solar times.

Thus, by finding the mechanical times, when the same star culminates any two nights, rather at a distance from each other than successive, we have the difference between a sidereal day and a mechanical day; and consequently between a mechanical day and a solar day of a mean length.

Hence any number of mechanical minutes may be converted into solar or into sidereal minutes by the rule of three.

These observations will answer the purpose the more exactly as the star is nearer to the prime vertical; because the variation of its altitude is here greater in a given time, than if it were situated in any other vertical oblique to the meridian. In the latitude of

50 degrees an error of one minute in altitude, at any point of the prime vertical, will cause an error of 6½ seconds in time; and in the latitude of 55 degrees it will cause an error of near 7 seconds; as that excellent geometer Mr Cotes has shewn in his treatise concerning the *Effimation and Limits of Errors* in mixed mathematics, published at the end of his admirable book called *Harmonia Mensurarum*. It is also the safest to choose a star as high as possible, lest a different state of the atmosphere should cause a different refraction of the visual rays, and consequently an error in the times of observation.

The solar time may also be found by observing when the sun himself has equal altitudes in the morning and evening; if we correct the time of the latter observation by a just allowance for the variation of the sun's declination, as follows. Upon a celestial globe let the pole be at P ; the vertex of the observer's place at V ; the complement of its latitude PV ; its meridian $PVBG$; a circle of equal altitudes $ABCD$, described about its pole V ; and passing thro' the sun's centre at A at the time of the morning observation, and through it at D at the time of the evening observation; two circles of declination, PAF , PDI , cutting the equator $FGHI$, in F and I ; a parallel of declination ACE , cutting the circle PDI in E , and ABD in C ; three equal vertical arches VA , VC , VD ; and lastly, a third circle of declination PCH cutting the equator in H . Now, had not the sun varied his declination from A or E to D , in the evening he would have had the same altitude at C as in reality he has at D . And then as the angles VPC , VPA , would have been equal, so the times of the evening and morning observations would also have been equidistant from noon; being measured by those angles, or by the arches GF , GH . Therefore the angle CPD , or the arch IH , which measures it, is also the measure of a portion of time to be subtracted from the evening observation, if the sun's declination varies northwards, otherwise to be added, to give the time sought equidistant from noon. Let another circle of declination Pkl bisect the small angle HPI , and consequently the small arches CD and HI in k and l . Draw the vertical arch kV ; and in the triangle kPV , we have given PV the complement of the latitude, and Pk half the sum of the given complements, PC or PA and PD , of the sun's declinations at the times of the two observations, and lastly, the included angle kPV , by converting half the interval of time between the observations into degrees and minutes. Hence by trigonometry we have the angle PkV , of an intermediate magnitude between PCV and PDV , and therefore fitter to be used instead of either of them. Hence also we shall have the arch Ih ; by taking it in proportion to DE the difference of the declinations, as the co-tangent of the angle PCV , to the sine of the arch PC or PA . For Ih is to DE in a ratio compounded of Ih to CE and of CE to DE , that is, of the radius to the sine of the arch PC , and of the co-tangent of the angle DCE or PCV to the radius: as appears by taking away the common angle DCP from the right angles ECP and DCV ; and by considering the small triangle DCE , right-angled at E , as if it was rectilinear. The calculation supposes the sun's centre has equal altitudes at A and D ; which is agreeable to the

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fig. 4.

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Mechanism of observations that determine when his upper or his under limb has equal altitudes."

SECT. VI. *Of the Mechanism of the principal Optical Instruments.*

As part of the mechanism of optical instruments depends on a knowledge of the arts of casting, polishing and folding brads and other metals, of turning wood, &c. we must necessarily confine ourselves in this section to some directions concerning the grinding and polishing of the glasses and specula for microscopes and telescopes, with the method of putting them together and adjusting them; leaving the fabrication of the other parts to be learned by the ingenuity and industry of those who choose to employ themselves in that manner, and for which scarce any rules that would be of much service can be laid down.

§ 1. *Of making Glass-globules for Microscopes.*

THOUGH these are not found to be of such use as small convex lenses, yet as they are easily made, and are still used through choice by some persons, we shall here give some of the best methods of making them. Mr Butterfield's method of making these was by the flame of a spirit-lamp, which, instead of a wick, had several folds of fine silver-wire doubled up and down like a skein of thread. Having prepared some fine glass, beaten to powder and washed very clean, he took a little of it upon the sharp point of a silver needle wetted with spittle, and held it in the flame, turning it about till it become quite round, but no longer, for fear of burning it. The art lies in giving the globules an exact roundness, which can only be learned by experience. When a great many globules were thus formed, he rubbed them clean with soft leather. Then, having several small pieces of thin brass plates, twice as long as broad, he doubled them up into the form of a square, and punched a fine hole through the middle of them; and having rubbed off the bur about the holes with a whetstone, and blacked the insides of the plates with the smoke of a candle, he placed a globule between the two holes, and tacked the plates together with two or three rivets.

Dr Hooke, for the same purpose, used to take a very clear piece of glass, and draw it out into long threads in a lamp; then he held these threads in the flame, till they ran into round globules at the end. He next fastened the globules with sealing-wax to the end of a stick, so that the threads stood upwards, and grinding off the ends of the threads upon a whetstone, polished them upon a smooth metal plate with a little putty.

Mr Stephen Gray tells us, that, for want of a spirit-lamp, he laid a small particle of glass, about the bigness of the intended globule, upon the end of a piece of charcoal, and by the help of a Blow-Pipe, with the flame of a candle, he soon melted it into a globule. By this means he made them indifferently clear, and the smallest very round; but the larger, by resting upon that side, became a little flatted, and received a roughness on that side. He was therefore wont to grind and polish them upon a brass plate till he reduced them to hemispheres; but he found, that the small round globules, besides that they magnified more, shewed objects more distinctly than the hemispheres.

§ 2. *Of grinding Lenses for Telescopes and Microscopes.*

A LENS is more easily made of an equal convexity on both sides than of any other figure, because the same tools will serve for grinding both its surfaces. And a glass of this figure will make as perfect an image as any other, because the aberrations of the rays occasioned by the spherical figures of the surfaces, whatever be the proportion of the semidiameters, are inconsiderable in long telescopes, in proportion to what is occasioned by the different refrangibility of the rays, which last error Mr Dollond has shewn how to correct. If it be proposed, then, to make a glass of equal convexities, that shall have a given focal distance, the radius of the spherical surface will be found by taking it in proportion to the given focal distance as 12 to 11, putting the sine of incidence to the sine of refraction out of air into glass as 17 to 11, which Sir Isaac Newton hath accurately determined it to be. The focal distance of the glass being given, its aperture may be found by the following table.

Length of the telescope, or focal distance of the object-glass.	Linear aperture of the object glass.	Focal distance of the eye-glass.	Linear amplification, or magnifying power.
Feet.	Inch&Dec.	Inch&Dec.	
1	0.55	0.61	20
2	0.77	0.85	28
3	0.95	1.05	34
4	1.09	1.20	40
5	1.23	1.35	44
6	1.34	1.47	49
7	1.45	1.60	53
8	1.55	1.71	56
9	1.64	1.80	60
10	1.73	1.90	63
13	1.97	2.17	72
15	2.12	2.32	77
20	2.45	2.70	89
25	2.74	3.01	100
30	3.00	3.30	109
35	3.24	3.56	118
40	3.46	3.81	126
45	3.67	4.04	133
50	3.87	4.26	141
55	4.06	4.47	148
60	4.24	4.66	154
70	4.58	5.04	166
80	4.90	5.39	178
90	5.20	5.72	189
100	5.48	6.03	199
120	6.00	6.60	218
140	6.48	7.13	235
160	6.93	7.62	252
180	7.35	8.09	267
200	7.75	8.53	281

TABLE continued.

Feet.	Inch&Dec.	Inch&Dec.	
220	8.12	8.83	295
240	8.48	8.93	308
260	8.83	9.71	321
280	9.16	10.08	333
300	9.49	10.44	345
400	10.95	12.05	398
500	12.25	13.47	445
600	13.42	14.76	488

These proportions, in Huygens's table for refracting telescopes, are measured by the Rheinland foot, which is to the English foot as 139 to 135: so that, taking their lengths of as many English feet, their apertures and eye-glasses and linear amplifications should be severally diminished in the subduplicate ratio of 139 to 135; that is, nearly in the ratio of 139 to 137, or about $\frac{7}{8}$, or $\frac{7}{8}$ th part of the whole.

Because the figure of the glass cannot be made exactly true to its very edges, the breadth of it may be about half an inch more than the diameter of its aperture, or even three quarters, or a whole inch more, if its focal distance be between 50 and 200 feet. Mr Huygens directs in general to make the breadth of the concave tool or plate in which an object-glass must be ground, almost three times the breadth of the glass; though in another place he speaks of grinding a glass whose focal distance was 200 feet, and breadth $8\frac{1}{2}$ inches, in a plate only 15 inches broad. But for eye-glasses, and others of a shorter radius, the tool must be in proportion to the breadth of these glasses, to afford sufficient room for the hand in polishing. Huygens made his tools of copper or cast brass; which, for fear they should change their figures by bending, can hardly be cast too thick: nevertheless he found by experience, that a tool 14 inches broad and half an inch thick was sufficient for grinding glasses to a sphere of 36 feet diameter; when the tool was strongly cemented upon a cylindrical stone an inch thick, with hard cement made of pitch and althes.

In order to make moulds for casting such tools as are pretty much concave, he directs that wooden patterns should be turned in a lathe all little thicker and broader than the tools themselves. But for tools that belong to spheres above 20 or 30 feet diameter, he says it is sufficient to use flat boards turned circular to the length and breadth required. When the plates are cast, they must be turned in a lathe exactly to the concavity required. And for this purpose it is requisite to make a couple of brass gauges in the following manner.

Take a wooden pole a little longer than the radius of the spherical surface of the glass intended, and through the end of it strike two small steel points at a distance from each other, equal to the radius of the sphere intended; and by one of the points hang up the pole against a wall, so that this upper point may have a circular motion in a hole or socket made of brass or iron firmly fixed in the wall. Then take two equal plates of brass or copper well hammered and smoothed, whose length is somewhat more than the breadth of the tool of cast brass, and whose thickness may be a tenth or a twelfth part of an inch, and the

breadth two or three inches. Then having fastened these plates flat against the wall in an horizontal position, with the moveable point in the pole strike a true arch upon each of them. Then file away the brass on one side exactly to the arch struck, so as to make one of the brass edges convex and the other concave; and, to make the arches correspond more exactly, fix one of the plates flat upon a table, and grind the other against it with emery. These are the gauges to be made use of in turning the brass tools exactly to the sphere required.

But if the radius of the sphere be very large, the gauges must be made in the following manner. Suppose the line AE, fig. 1. drawn upon the brass plate, to be the tangent of the required arch AFB, whose radius, for example, is 36 feet, and diameter 72. From A set off the parts AE, EE, &c. severally equal to an inch, and let them be continued a little beyond half the breadth of the tool required. Then, as 72 feet or 864 inches is to one inch, so let one inch be to a fourth number; this will be the number of decimal parts of an inch in the first line EF, reckoning from A. Multiply this fourth number successively by the numbers 4, 9, 16, 25, &c. the squares of 2, 3, 4, 5, &c. and the several products will be the numbers of decimal parts contained in the 2d, 3d, 4th, and 5th EF respectively. But because these numbers of parts are too small to be taken from a scale by a pair of compasses, subtract them severally from an inch represented by the lines EG; and the remainders being taken from a scale of an inch divided into decimal parts, and transferred by the compasses from G to F, will determine the points F, F, &c. of the arch required; after which the brass plate must be filed away exactly to the points of this arch, and polished as before.

To apply the brass tool to a turning lathe in order to turn the concave surface of it exactly spherical, let the brass fig. 2. represent a view of some part of the lathe, taken from a point directly over it; let *ab* represent a strong flat disk of brass half an inch thick at least, having a strong iron screw-pin firmly fixed in the centre of it, and standing out exactly perpendicular to one side; by which it may be screwed into the end *c* of the mandrel or axis of the lathe, represented by *cd*. This disk is represented separately in fig. 3. and must be well soldered to the backside of the tool *ef*, which therefore, in the middle of it, must be made plane, and exactly parallel to the circumference of its opposite surface, in order that the circumference may be carried round the axis of the lathe in a plane perpendicular to it. The mandrel or axis *cd* turns upon a point *d* in the puppet-head of the lathe, and in an iron collar represented by *st*.

Let *ghik* represent a board nailed fast on the other puppet-head; and let the concave gauge *gh* be laid upon this board, with its concave arch parallel to the concavity of the tool *ef*, and be screwed down to the board with flat-headed screws sunk into the brass. Let *lmno* represent such another board lying upon the former, with the convex gauge *lm* screwed to the under side of it; so that, by moving this upper board, the arch of the concave gauge may be brought to touch the concave one, and to slide against it. The turning tool *pq* is laid upon the moveable board, and is held fast to it by a broad-headed screw at *r*, to be turned

Mr Huygens's directions concerning the size of the tools and gauges for grinding.

Method of making the moulds.

Of making the gauges.

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Of turning the brass tool.

Fig 2, 3, 4.

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or turned by the hand upon occasion. To know whether the concave gauge be exactly parallel to the concavity of the tool *ef* screwed fast to the mandrel, direct the point *p* of the turning tool *pq* to touch any point of the tool *ef* near its circumference: then having fixed the turning tool *pq* by its screw *r*, turn the brass tool *ef* half round, and move the upper board till the point *p* of the turning tool be brought over-against the same mark upon the tool *ef*; and if it just touches it as before when the gauges coincide, all is right. If not, the position of the head of the lathe may be altered a little by striking it with a mallet. But the best way is, to make this examination of the situation of the concave gauge, when only one end of it is fixed to the lathe by a single tack or screw, about which it may easily be moved into its true position. And while the tool or plate *ef* is turning, the same examination of its parallelism to the gauge must be frequently repeated; otherwise its surface will take a false figure. It is convenient that the upper board *luno* should project over both the gauges; and to keep its surface parallel to that of the under board, two round-headed nails, or a plate of brass, as thick as the gauges, must be fixed to its under surface, towards the opposite side *no*. Care must be taken to drill the holes in the gauges, through which they are screwed to the boards, not too near the polished arches for fear of altering their figure by the yielding of the brass. The tool and all the parts of the lathe must be fixed very firm; because any trembling motion will cause the graving tool *pq* to indent the brass. After the tool is well turned, it must be separated from the brass *ab* by melting the solder with live coals laid upon it. In a similar manner may a convex tool be turned by transposing the gauges.

Mr Huygens advises first to form the plates or tools in a turning lathe; and then to grind them together with emery; that is to say, the concave and convex tool of the same sphere together. But the tools of very large spheres, he would have ground at first quite plane by a stone-cutter; and then ground hollow with a round flat stone and emery to the proper gauge. And he prescribes to use for this grinding first a stone half as broad as the tool, and after that another nearly of the whole breadth of it; and in this way of forming the tools, it will be convenient to tie a little frame of thick paper, or rather of thin pasteboard, about an inch high, round the tool, in order to keep in the emery; and in grinding, the whole must be made extremely firm. When the tool is to be polished, it must still remain upon the stone pedestal; otherwise it will be in danger of bending a little in the operation.

For polishing the tools when ground, Mr Huygens directs the concave tool to be daubed with soap; after which, he takes the round stone above-mentioned, somewhat less than the tool, (or the convex tool itself), and heats it; then he pours upon it some hot melted cement (made of pitch and fine powdered and sifted ashes, as much as he can mix with it), and then he turns over the stone and cement upon the concave tool, into which also he had poured a good quantity of the same cement; having first laid three little pieces of brass, of equal thicknesses, on the circumference of it, in order to press and keep this crust of cement of an exact equal thickness

in all its parts; and thus he lets them cool together. Then taking the stone from the tool, and turning it up, he lifts upon the cement that sticks to it a crust of very fine emery; and with a flat iron spatula, about one third of an inch thick, gently warmed, he presses lightly the emery, to stick to and incrustate upon the cement. The whole is then gently warmed, *viz.* the stone, cement, and emery, and he again replaces it upon the concave tool, and leaves it again to cool; so that he has by this means a crust of emery exactly of the figure of his tool; and with this he polishes the tool dry, without the addition of any wet, pressing it hard on the surface of the tool. To press it the harder, he places upon it a long pole, a little bent, to make it spring, whose upper end is fixed to the ceiling of the room, or else is pressed downwards by a strong iron spring; and he thinks it is necessary to have two persons to rub the stone upon the tool. Here, however, it must be observed, that great care must be taken in this, and in all cases where this way of grinding by a pole is made use of, to fix the point of pressure exactly in the middle.

To bring the concave tool still nearer to perfection, take equal pieces, about an inch square, of blue hone, such as are used by engravers for polishing their copper, and place as many of them as you can upon the surface of the tool to be polished, laying the grain of them, some one way, some another; sticking them as close as you can to one another with soap and common white starch: then fill up all the interstices of the hones with clean dry sand, to about two thirds of the thickness of the hones; then having a border of paper or pasteboard put round the tool as before, shake the tool gently, that the sand may equally subside, and blow it every where to an equal depth with a pair of bellows. Then take some hard cement, extremely hot, and pour it all over the hones; then having cleaned the stone, or convex tool, which before was incrustated with pitch and emery, place this stone (or convex tool) warmed, on the top of the cement, and let all cool together. Then rubbing the tool with this polisher made with hones, by applying your pole to the top of the stone as before, you will know when the tool is brought to perfection, by wiping off the filth, in which case all parts of it will appear equally bright by looking upon it obliquely against the light. If you would use this polisher again, it must be kept in a cool cellar, leaving the hones uppermost; otherwise in warm weather they will change their situation in the cement, even by their own weight.

The cement used for fastening the glasses is made of several different compositions, according to the fancy of the operator. Cherubin informs us, that it was usually made of common black pitch and fine sifted vine-ashes: but he himself made it of rosin and ochre, or rosin and Spanish white; pounding the rosin first, and mixing it with a due quantity of the powder, and then sifting the mixture upon hot melted pitch, and while hot, well mixing and incorporating the whole. By others, the cement is made of pitch and common coal-ashes sifted fine. In all cases, it is harder or softer, as more or less of the ashes or other fine powder is put into it: and in the present case, for polishing these tools, it must be made as hard as possible, by putting in a large quantity of ashes; for otherwise, if the cement

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ment is not hard enough, the particles of the emery will be loosened by the heat in grinding, and then will only run round upon the tool, without working out the little inequalities thereof. If the emery should be found to grow blunt, a very little more of it may be dusted dry upon the tool, by which its sharpness and cutting quality will be a little recovered; but if the cement be sufficiently hard at first, the emery will always remain sufficiently sharp.

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Of choosing
the glass.

The best kind of glass is perfectly white; but great care must be taken in choosing it totally free from veins. To discover these veins, one should look very obliquely against a small light in a room otherwise dark. In this manner one may examine pieces of a polished looking-glass, of which object-glasses are sometimes made; but because these are seldom of a sufficient thickness for this purpose, it will be proper to take some pieces of the same sort of glass before it is polished, and get it ground to an equal thickness and polished a little by the common glass-grinders, in order to judge what pieces are fit for use. Sometimes little veins will appear like fine threads, which scarce do any harm. Sometimes their imperfections cannot be discovered by the former way of trial; and yet after the glass is well formed and polished, they will appear by reflection in the following manner. In a dark room place the glass upright upon a table, turning that surface from you which is suspected to be faulty; then holding a lighted candle in your hand, so that the middle of the broad light reflected from the first surface may fall upon your eye, recede from the glass till the rays reflected from the back surface shall just begin to invert the candle; then the whole glass will appear all over bright, and then you will discover its defects, and the imperfections of the polish. When the glass is a portion of a large sphere, we use a small perspective, three or four inches long, to magnify the defects.

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How glasses
are to be
smoothed
and round-
ed.

The pieces of glass above-mentioned should be much broader than the intended object-glasses, that there may be room enough for choosing the best part of them. For planing and smoothing these large pieces of glass, plates of cast-iron may be made use of; such as are sold at the iron-mongers shops, after they have been ground and planed on a stone-cutter's engine. Upon the plate of glass, with a diamond-pointed compass, strike a circle representing the object-glass; and also another concentric circle, with a radius about a tenth or twelfth part of an inch bigger: And also two other such circles, on the other side of the glass, directly opposite to the former; which may be done by means of the circular glass to be afterwards described. The larger parts of the glass may be separated from the outward circle by a red-hot iron, or by a strong broad vice, opened exactly to the thickness of the glass. The remaining inequalities may be taken off by a grind-stone; beginning with the largest first, and taking care that they do not splinter. Then, having warmed the glass, cement a wooden handle to it, and in a common deep tool for eye-glasses, making use of white clear sand and water, grind the circumference of the glass exactly true to the innermost circle on each side of it. Then, having made a great many small cavities with a punch upon one side of a round copper-plate, and having fixed the

other side of it upon the middle of the round glass, by cement made with two parts of rosin or hard pitch, and one part of wax, place the steel-point of the springing pole above described, being 14 or 15 feet long, into that cavity of the copper plate which lies nearest the thickest part of the glass; then work the glass by the pole with sand and water upon a flat plate of cast iron, of a round figure, the plate having been planed with sand and water by a stone-cutter. Then having examined the thickness of the glass in several places by a hand-vice, which is better than a pair of calipers, by repeating the same operation, it will soon be reduced to an equal thickness in all its parts. Towards the end of this operation it will be convenient to make use of sifted emery, because the sand will scratch too deep: and then it will also be necessary to place the steel-point of the pole exactly over the centre of the under surface of the glass; otherwise that surface will take a cylindrical or convex figure, even though it was exactly plane before you began to grind it; and when concave glasses are to be polished, it is also absolutely necessary to place the point of pressure exactly over the centre of the under surface of the glass. To bring one of the little cavities in the copper-plate exactly over that centre, a circular glass is made use of, formed from a broken looking-glass with the quick-silver rubbed off. On this must be described, with a diamond-pointed compass, eight or ten concentric circles, about a quarter of an inch distant from each other, so that the larger circles may be somewhat bigger than the circumference of the glass to be polished. Lay this circular glass upon the surface of the glass to be polished; and move it to and fro till you perceive that the circumference of the glass to be polished is exactly parallel to the nearest circle upon the circular glass; then, having inverted both the glasses, lay the circular glass upon a table, and having laid a small live coal upon the copper plate, to make it moveable on the cement, place one point of a pair of compasses in one of the little cavities, and move the copper till a circumference described with the other point coincides exactly with any one circle upon the circular glass, and the business is done. It is convenient to paste three slender shreds of fine linen directed towards the centre of the circular glass, that the other glass may not slide too easily upon it, and that they may not scratch one another. The cavities punched in the copper plate, and also in the point of the pole, should be triangular, to hinder the rotation of the glass; which is still more necessary in giving it the last polish. Here also we must observe whether the circumference remains exactly circular on both sides of it, which must be tried with compasses: and if it be not, it must be corrected again by grinding it exactly circular in a common tool for making eye glasses; which will contribute very much to its taking an exact spherical surface when it comes to be ground in its proper tool. For if any part of the circumference be protuberant, it will hinder the adjoining parts of the surface from wearing so much as they should do; and of consequence will spoil its surface.

When the glass is thoroughly planed and rounded as above, take away the plate with the several cavities, and, with some of the same cement, fix on a smaller round piece of brass or rather steel truly flat, and

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fig. 5.

and turned about the bigness of a farthing, but thicker, having first made in the centre thereof, with a triangular steel punch, a hole about the bigness of a goose-quill, and about the depth of $\frac{1}{4}$ of an inch; and at the very bottom of this triangular hole, a small round hole must be punched, somewhat deeper, with a very fine steel punch. A small steel point about an inch long must be truly shaped and fitted to this triangular hole, end, at the very apex, to the small, round, deeper impression. Nevertheless, it must not be fitted so exactly, but that it may have some liberty to move to and fro; the apex always continuing to press upon the surface of the round hole below. This steel triangular point must be fixed to one end of a pole; to the other end of which another round iron point must be fixed, of about five or six inches long, to play freely up and down in a round hole in a piece of brass let into a board fixed in the ceiling for that purpose, perpendicularly over the bench, and over the centre of the tool, which must be strongly and truly fixed horizontally thereon. Mr Huygens directs the brass plate to be fixed to the glass by means of cement, and takes no notice of any other method whatever; though it is plain, that it is hardly possible, in this, or any other case, to bring the cement to a fluidity sufficient to fix two plane surfaces exactly parallel to one another, without heating the glass, and the brass also, to a very great degree, and thus endangering the glass considerably. To avoid this, some have used plaster of Paris; others cement an intermediate glass to the brass or wood, and then fix the glass to be ground to the outward surface of the cemented glass with common glue. It may easily be done, however, with common isinglass or fish-glue, which will run very fluid, and will fix the glass and the brass of itself strongly together. Some common soft red wax is to be stuck on the edges of the brass, to keep wet from getting to the glue.

For grinding glasses truly plane by this method, Mr Huygens prescribes the pole to be about 15 feet long; but, in grinding upon a concave plate, the pole is most conveniently made of the same length with the radius of the sphere, though Dr Smith is of opinion that it would not be material if made considerably shorter, as the height of the room may allow. It is necessary to have, lying by, an ordinary piece of coarse glass ground in the same tool, called a *brasier*; whereby, when any new emery is laid on the tool in grinding the glass, it must be first run over and smoothed, for fear that any little coarse grains should remain and scratch the glass.

Things being thus prepared, some pots of emery of various finenesses must be prepared. Take of the roughest sort a small half-pugil, wetting and daubing it pretty equally on the tool: then lay on your glass, and fix up the pole, continuing to grind for a quarter of an hour; not pressing upon the pole, but barely carrying the glass round thereby: then take the like quantity of some fine emery, and work another quarter of an hour therewith; and then take the like quantity of emery still finer; and work for the same time: after which you must work for an hour and an half with some of the finest emery you have, taking away by little and little some of the emery with a wet sponge. It must neither be

kept too moist nor too dry, but about the consistence of pap. Much depends on this last circumstance. For, if it is too dry, the emery will clog and stick, and incorporate in such a manner as to cut little or none at all, unless here and there, where its body chances to be broke; and in those places it will scratch and cut the glass irregularly: or if it is too much diluted, it will, from the irregular separation of its parts, cut in some places more than in others, as in the former case.

But Mr Huygens tells us, that this method of using various sorts of fresh emery is not good; as in this way, he finds by experience, that the best glasses are often scratched. For this reason, he advises to take a large quantity of emery of the first or second sort, and work with it from first to last, taking away by little and little every half hour, or quarter of an hour, more and more of the emery with a wet sponge. By this means he could bring the glass extremely smooth and fine, so that a candle or sash window could be seen through it pretty well defined; which is a mark of its being sufficiently well ground for receiving the last polish. But, if the glass has not acquired this degree of transparency, it is certain, says Mr Huygens, that too much emery remains; and therefore it must still be diminished, and the operation continued. He found common well-water most proper in this operation of grinding; and he took care to move the glass in circles, taking an inch beyond the centre of the tool, and somewhat beyond its outside; and he found in a glass of 200 feet, whose diameter was $8\frac{1}{2}$ inches, which he ground in a tool of 15 inches diameter, that the figure of the tool in grinding would alter considerably, unless he carried the glass round an inch beyond the centre of the tool one way, and $3\frac{1}{2}$ inches beyond the skirts of it another way; but if he carried it no farther than a straw's breadth beyond the skirts of the tool, and of consequence farther beyond the centre, the glass would always grind falsely, so that he could never afterwards bring the outsides of it to a true and fine polish.

When you first begin to grind, and the emery begins to be smooth, the glass will stick a little to the tool and run stiff. Then fresh emery is to be added. When it afterwards comes to be polished, it will, if large, require a considerable strength to move it; but this inconvenience will happen less in grinding by the pole than in grinding with the hand. For the warmth of the hand makes the substance of the glass swell; and not only increases the sticking of the glass, but in some measure may spoil the figure of it, as also of the tool. When it is ground with the pole, it never sticks very strongly, unless when you take the glass off from the tool, and keep it from it for some time, and then apply it to the tool again: and this in large glasses; for by this means the glass gets from the air a greater warmth than it had on the tool; and being again applied to the tool, its lower surface is suddenly contracted by the cold, and thus sticks to the tool. Wherefore, says Mr Huygens, you must in that case wait till the glass and the tool come to be of one temperature. The like effect is observable in grinding when there is a fire in the room; and hence we may see the great nicety requisite in grinding these large glasses, and the necessity of attending even to the minutest circumstances.

Instead of emery, Father Cherubin prescribes the grit of a hard grind-stone, well beaten into fine powder, and sifted. The same thing hath been done by common white-sand washed clean, taking away by little and little the grit as it became finer and finer. Nay, glasses have been frequently polished off in this manner without the use of any other material whatever. This method is called *drying off on sand*; because, as the matter grows finer and finer, they wet it less and less, till for the last quarter of an hour (the whole work lasting nearly two hours) they only wet it by breathing upon it; and at the very last, not at all. This method, however, is now entirely disused; for which Dr Smith assigns, as one reason, the violent labour requisite at the last: another and better reason, he says, may be, the great improbability of grinding or polishing true by this method, by reason of the uncertain and unequal force of the hand. But if this last is the reason, Dr Smith is of opinion, that the method might be restored, and greatly improved by adding a pole, and spring to press down the pole, or some analogous contrivance. And in all methods of grinding hitherto invented, the artist must allow time to bring his glass by grinding to the smoothest and finest surface that he possibly can, before he attempts to give the last polish. For the smoother you bring it in grinding, the less labour you will have in polishing; in which consists not only the greatest difficulty, but the greatest danger of spoiling all you have already done.

In order to give the last and finest polish to glasses, Mr Huygens directs us to proceed as follows. "Having removed the little brass plate from the glass, take a very thick slate, or rather a block of blue or grey stone; let it be half an inch thick, and let it be ground true and round at the stone-cutter's; its diameter being somewhat smaller than the diameter of your glass, leaving a hole quite through in the centre, of about an inch diameter. Then make some cement of two parts rosin or hard pitch, and one part wax; and taking a piece of thick kersey cloth, truly and equally wrought, cut this cloth round, and leave a like hole one inch diameter in the middle. Then warming the stone and also warming the glass, and spreading thinly and evenly upon them some of this cement, lay on the cloth, and thereupon lay also the glass, having left in the middle a space the breadth of a shilling uncemented and blacked with a candle. Then provide an hollow conical plate of iron or steel (shaped like an high-crowned hat) having the basis of the cone 1 inch diameter, and having round the basis a flat border about $2\frac{1}{2}$ inches diameter, and having the depth or altitude of the cone exactly of the thickness of the slate, cloth, and cement, to which the glass is fixed. The vertex of this cone must go down thro' the slate and cloth; so that being cemented on the slate, the said vertex may approach to the glass within a hair's breadth, and lie perpendicularly over the centre of the lower surface of the glass; and this must be adjusted by the circular glass described above. Within the vertex of this hollow cone, the lower point of the pole is to be applied in polishing; but it may be first proper to be observed, that fish-glue and a brass plate, in lieu of the dimensions of the aforesaid slate, may perhaps be better. Mr Huygens observes also, that the angle of the cone should be 80 or 90 de-

grees, and that the hollow vertex of it should be solid enough to receive a small impression from a round steel punch, to put the point of the pole into, which might otherwise have too much liberty, and slip from the vertex. The design of the black spot in the middle of the glass, is to discover by the light of a candle obliquely reflected from your glass, after it has been polished some time, whether it be perfectly clear, and free from the appearance of any bluish colour like that of althes.

Before the work of polishing is begun, it is proper to stretch an even well wrought piece of linen over the tool, dusting thereupon some very fine tripoly. Then taking the glass in your hand, run it round 40 or 50 times thereupon; and this will chiefly take off the roughness of the glass about the border of it, which otherwise might too much wear away the lower parts of the tool, in which the glass is chiefly to obtain its last polish. This cloth is then to be removed, and the glass is to be begun to be polished upon the very naked tool itself. But first there is to be prepared some very fine tripoly, and also some blue vitriol, otherwise called *cyprion*, English and Hungarian vitriol finely powdered: mix four parts of tripoly with one of vitriol: 6 or 8 grains of this mixture (which is about the quantity of two large peas) is sufficient for a glass 5 inches broad. This compound powder must be wetted with about 8 or 10 drops of clear vinegar in the middle of the tool; and it must be mixed and softened thoroughly with a very fine small mallet. Then with a coarse painting brush, take great care to spread it thinly and evenly upon the tool, or at least upon a much larger space in the middle of it than the glass shall run over in the polishing. This coat must be laid on very thin, (but not too thin neither), otherwise it will waste away too much in the polishing, and the tool will be apt to be furrowed thereby, and to have its figure impaired; inasmuch that sometimes a new daubing thereof must be laid on, which it is not easy to do so equally as at first. This daubing must be perfectly dried by holding over it a hot clean frying-pan, or a thin pan of iron, with light charcoal therein for that purpose; then leave all till the tool is perfectly cold. Then having some other very fine tripoly very well washed and ground with a mallet, and afterwards dried and finely powdered, take some of the same and throw it thinly and evenly on the tool so prepared; then take your coarse glass which lay by you, and smooth all the said tripoly very evenly and finely: then take your glass to be polished, and wipe it thoroughly clean from all cement, grease, or other filth which may stick to it, with a clean cloth dipped in water, a little tinged with tripoly and vitriol; then taking your glass in your hand, apply it on the tool, and move it gently twice or thrice, in a straight line, backwards and forwards; then take it off, and observe whether the marks of the tripoly, sticking to the glass, seem to be equally spread over the whole surface thereof; if not, it is a sign that either the tool or the glass is too warm; then you must wait a little and try again till you find the glass takes the tripoly every where alike. Then you may begin boldly to polish, and there will be no great danger of spoiling the figure of the glass; which in the other case would infallibly happen. If the tool be warmer than the glass, it will touch the glass harder

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er in the middle than towards its circumference; because the upper surface of the tool being swelled by heat will become too flat. On the contrary, if the glass be warmer than the tool, it will wear harder towards its circumference than at the centre; because the inferior surface of the glass is contracted by the coldness of the plate, more than the superior.

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Sir Isaac
Newton's
method of
polishing.

Mr Huygens says, that if the work of polishing were to be performed by strength of hand only, it would be a work of very great labour, and even could not be performed in glasses of 5 or 6 feet focal distance: and he seems to think it absolutely necessary that an extraordinary great force or pressure should be applied upon the glass. For this purpose he has therefore contrived and described two methods for sufficiently increasing the pressure; both of which chiefly consist in applying the force of a strong spring to press down the centre of the glass upon the polisher.

This operation of polishing, as it is one of the most difficult and nice points of the whole, hath been very variously attempted and described by various authors. Sir Isaac Newton, Pere Cherubin, Mr Huygens, and the common glass-grinders, have taken different methods in this matter. Sir Isaac is the only person who seems not to insist on the necessity of a very violent and strong pressure. In the English 8vo edition of his Optics, p. 95. he hath these words: "An object-glass of a 14 foot telescope, made by an artificer at London, I once mended considerably, by grinding it on pitch with putty, and leaning very easily on it in the grinding, left the putty should scratch it. Whether this may not do well enough for polishing these reflecting glasses, I have not yet tried. But he that shall try either this or any other way of polishing which he may think better, may do well to make his glasses ready for polishing by grinding them without that violence wherewith our London workmen press their glasses in grinding: for by such violent pressure, glasses are apt to bend a little in the grinding, and such bending will certainly spoil their figure."

As to his own method of polishing glass, he now there expressly describes it; but his method of polishing reflecting metals he doth; and it was thus, in his own words, p. 92. "The polish I used was in this manner. I had two round copper plates each six inches in diameter, the one convex the other concave, ground very true to one another. On the convex I ground the object-metal or concave, which was to be polished, till it had taken the figure of the convex and was ready for a polish. Then I pitched over the convex very thinly, by dropping melted pitch upon it, and warming it to keep the pitch soft, whilst I ground it with the concave copper wetted to make it spread evenly all over the convex. Thus by working it well, I made it as thin as a groat; and after the convex was cold I ground it again, to give it as true a figure as I could. Then I took putty, which I had made very fine by washing it from all its grosser particles; and laying a little of this upon the pitch, I ground it upon the pitch with the concave copper till it had done making a noise; and then upon the pitch I ground the object-metal with a brisk motion for about two or three minutes of time, leaning hard upon it. Then I put fresh putty upon the pitch, and ground it again till it had done making a noise, and afterwards ground the object-metal upon it as before. And this work I re-

peated till the metal was polished, grinding it the last time with all my strength for a good while together, and frequently breathing upon the pitch to keep it moist, without laying on any more fresh putty. The object-metal was 2 inches broad, and about $\frac{1}{2}$ of an inch thick to keep it from bending. I had two of these metals, and when I had polished them both, I tried which was best, and ground the other again to see if I could make it better than that which I kept. And thus by many trials I learned the way of polishing, till I made those two reflecting perspectives I spoke of above. For this art of polishing will be better learned by repeated practice than by my description. Before I ground the object-metal on the pitch, I always ground the putty on it with the concave copper, till it had done making a noise; because, if the particles of the putty were not by this means made to stick fast in the pitch, they would, by rolling up and down, grate and fret the object-metal, and fill it full of little holes. It seems not improbable, that glass may also be polished, with proper care, by the same method."

Pere Cherubin polishes with tripoly or putty; or first with tripoly, and afterwards with putty. But what he seems most to approve of is putty alone. He polishes in the same tool he grinds in, and describes various ways of doing it. He prescribes to stretch very tight a fine thin leather, fine English fustian, or fine Holland, or any fine linen, or fine silk taffety or satin, all of an equable thickness, as near as may be, upon the tool; then he daubs thinly on this surface, thus stretched, a streak of putty wetted to the consistency of thick syrup, about as broad as the glass, or a little more, passing through the centre of the tool directly from him; then smoothing the putty by running his bruiser, and pressing it backwards and forwards to him and from him, he at length lays on the glass cemented to its handle, and giving it always the same motion, strongly pressing to him and from him along the streak of putty, and by such pressure forcing the surface of the silk, already somewhat stretched, close to the surface of the tool, to which the figure of the glass was exactly adapted, he says that he could by that means obtain an excellent fine polish on any of the abovementioned substances. Before every stroke, he turned the glass a little on its axis; and its handle was on this occasion considerably heavier than usual in grinding, which he commends as very useful in this business; and if new putty was wanting, he made no difficulty in laying it on as often as necessary, always carefully smoothing it thereon with the bruiser before the glass was applied.

This method, according to Dr Smith, might be improved by moving the glass, not by hand, but by the pole and spring, somewhat after the manner of Huygens; especially if the pole were contrived not to move loose in a round brass hole above, but on a strong point pressed down by some spring; the length of the pole being equal to the radius of the tool, and the point where the spring presses the upper end of the pole, being truly perpendicular over the centre of the tool, and exactly in the centre of its sphere.

Another method prescribed by Cherubin is as follows. He takes a sheet of very fine paper; and examining it carefully by looking upon it, and thro' it, he takes off with a sharp pen-knife all the little lumps,

Mechanism
of
Optical
Instruments

hard parts, and inequalities, that he can find; then he soaks it in clean water; then he dries it between two fine linen cloths, tho' not so much as to make it quite dry, but to leave it dampish; then, with some very thin starch or paste, he daubs equably all over the surface of his tool as thin as possible, but some every where; then he lays on his paper very gently and slowly, letting it touch and stick first at one side, and by degrees more and more towards the middle, and at last so as to cover the whole. This is done slowly, in order to let the air get out; then, with the palm of his hand he presses the centre, and every where round about it towards the circumference, to make the paper stick every where; and this he does three or four times while it is drying, to get out all the air. He lets it dry of itself, then revives with his knife as before: then he hath a very coarse bruiser of glass, whose circumference is sharply ground round, and at right angles to its surface, which he had coarsely ground before in the same tool. With this, and with a very heavy handle, he smooths and polishes and rubs off all the remaining inequalities of the paper; and when this is done, he lays on a streak of tripoly, and polishes in his other method.

Plate
CCXXVII.
fig. 7.

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Mr Huygens's machines for polishing.

At CC is represented a square beam of wood, a little longer than the diameter of the tool, and about $1\frac{1}{2}$ inch thick: the two extremities of it at C and C are bent downwards, and then are again directed parallel to the whole length, and serve for handles for the workman to lay hold of. In the middle of this beam there is fixed an iron spike, so long, that when the lower surfaces of the handles, C, C, are placed upon a plane, the point of the spike shall just touch the plane. This point presses upon the apex of the hollow cone, which descends through the hole in the slate, which, by the interposition of a cloth, was cemented to the glass B lying upon the tool A. To increase this pressure, a foot of bow, DED, is shaped out of a deal-board, half an inch thick, and five feet long, being seven inches broad in the middle, and tapered narrower towards its extremities, so as almost to end in a sharp point. The middle of the bow is fixed to the floor by an iron staple at E driven cross it; and is bent into an arch by a rope FIIF; to which two other ropes are tied at I and I; the interval II being equal to the length of the beam CC. One of these ropes ICCG goes over the back of the beam CC, passing through a hole in each handle at C and C, and then is lapped round a cylindrical peg at G, that passes through two wooden chaps, to the bottom of which the other rope is tied that comes from the other I. So that, by turning the peg G, to lap the rope about it, the bow DD may be bent as much as you please. The tool A is placed upon a strong square board fixed to the table O on one side, and supported on the other side by the post P. Then the workman fits down, and taking hold of the handles CC, he draws the glass to him and from him over the tool A, with a moderate motion; and after every 20 or 24 strokes, he turns the glass a little about its axis. This way of polishing took up two or three hours, and was very laborious as well as tedious; because the glass, being so much pressed downwards, was moved very slowly.

Instead of the bow DD, Mr Huygens afterwards invented another spring by sloping the flat ends of a couple

of dealboards $\alpha\beta$, $\alpha\gamma$; and by nailing the flat slopes together very firmly, that the boards might make an acute angle $\beta\alpha\gamma$. One of these boards β joined was laid upon the floor under the polishing table, the ends $\beta\gamma$ being under the middle of the tool A. So that they lay quite out of the way of the workman, who before was a little incommoded by the ends of the bow DD. The boards at the end α were 8 or 10 inches broad, and from thence went tapering almost to a point at β and γ . The board $\alpha\gamma$ lying upon the floor, the end β , of the upper board, was pulled downwards by a rope $\beta\epsilon$ that passed under a pulley ϵ , fixed to the floor, and then was lapped round a strong peg ζ that turned stiff in a hole in the floor. Under the end γ the middle of a strong stick $\delta\gamma\delta$ was fixed at right angles to the board $\alpha\gamma$, and cords were tied to each end of this stick at δ , δ , which went over the polishing beam C, C, as in the former machine. This stick was lifted up but very little from the floor at the time of polishing; and by consequence the ropes β C, δ C were long enough to give liberty of motion to the polishing beam CC. Two iron pins θ , θ , passing through the ends of the boards at α , were screwed into the floor; but the heads of the pins stood up above the boards, to give them liberty to rise up when the rope $\beta\epsilon$ was stretched.

To facilitate the labour of moving the glass back. Fig. 7. wards and forwards in the tool, Dr Smith made the following addition to the machine. At M is represented a strong hand made of wood or iron, having a square cavity cut through the bottom of it, for the polishing beam CC to pass through, not tight, but at some liberty. To one side of this hand M is annexed a long board LL, by means of an iron bolt. The breadth of the lower surface of this board LL is equal to the breadth of the hand M, being $2\frac{1}{2}$ inches; its thickness is half an inch, and its length equal to three femidiameters of the tool. The board LL must be drawn backwards and forwards lengthwise over a block H firmly fixed to a table O; the thickness of the block being such, that the board LL may lie an inch higher than the surface of the tool A. The wooden hooks at π , and the pins at π , keep the motion of the board in the same direction, by hindering it from slipping either upwards or sideways. Over this board, at right angles to it, and over the middle of the block H, there lies a wooden roller, having a strong iron axis which turns in the holes of two iron plates fixed to the ends of the block. The thickness of the roller is about an inch and an half. Thro' two holes bored thro' this roller, and made wider at one end of them, two strong cords are made to pass with knots at one end of them, to be drawn into the wider parts of the holes, that they may neither slip through, nor stand out from the roller. Then each cord is lapped round the cylinder several times; and one end of each is pegged firmly into the board LL at the end towards M, and the other ends of them are lapped round a peg at N; which being turned round, will stretch the cords as much as you please. At one end of the axis of this roller there is a handle Q, which being turned round backwards and forwards alternately, the board LL with the glass annexed to it is moved to and fro, so far, that about a third part of its diameter shoots both ways over the margin of the tool.

The

The spike in the middle of the beam CC presses the glass a little obliquely, because the hand M holds the beam CC, not tight, but somewhat loosely, to the end that the glass may pass over the tool without trembling. Nevertheless this inclination of the spike must be very small; and may easily be increased or diminished several ways. Two pins or stops must be fixed to the under surface of the board LL, to determine the length of the stroke. The tool A, or rather the stone to which it is cemented, is squeezed fast between the block H, and a strong stop on the opposite side of the stone, by the interpolation of a wedge. The workman sits upon a round stool; and, when one hand is tired with turning the roller, he applies the other; and therefore is not so soon tired as with the other machine, which required both hands, and also a reciprocating motion of the whole body. A longer handle Q_z was also made, which turned at both ends, for the convenience of using both hands at once.

After every 20 or 24 strokes, it is necessary to give the glass a small turn about its axis; which is easily done by laying hold of the plate fixed to it, with one hand, while the other hand goes on with the polishing motion. The tool must also be moved a little after every 25 or 50 strokes, by drawing it half a straw's-breadth towards that part of it which the glass has left, and by drawing it back again after as many more strokes. At the beginning of the work the tripoly will be gathered into little lumps in some places of the tool, but will be dispersed again in a little time; and then the area of the tool will become perfectly smooth. If the tripoly does not appear to stick equally to the glass in all parts, and to be diffused over it in slender straight streaks, the frying-pan with coals in it must be held over the tool again, till you perceive the area, or coat of tripoly is not quite so cold as the other parts of the tool. Then let tripoly be rubbed upon the tool again, and let the glass be pressed over it with your hand, to try whether it sticks equally to the glass in every place. When it does, you may proceed in the work of polishing. But when vitriol is used instead of verdigrease, all that is said about warming the tool may be omitted; because these coats always touch the glass as they should do, and stick better than before. The tool ought also, without being warmed, to be rubbed with tripoly over the coat, that the latter may be preserved more entire, and that the glass may touch it better, which must always be repeated after 200 or 400 strokes in polishing. The glass should also be taken from the tool after 200 strokes, by withdrawing the bolt L, which connects the hand M to the board LL, and by removing the beam CC. Then rub your finger upon the glass, or a clean rag, or a bit of leather, to examine how much it is polished.

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Method of
counting
the strokes
used in po-
lishing.

To save the trouble of counting the strokes, there is a wooden wheel A X, seven or eight inches broad, placed against a board fixed to the side of a wall. It turns easily about an axis, and has 24 teeth, like those of a saw, which are pushed round by a bended wire T Y X in the following manner. The wire turns about a centre Y; and while one end of it is pulled by the string TV tied to the end of the board LL, the opposite end Y X pushes back a long spring RS, fixed to the board at R; which, by pressing upon the wire at

S, causes the part Y X to bend a little, and so the point X, in returning to the wheel (the string being relaxed) falls a little lower into the next tooth, and pushes it forward in the position represented in the figure. There is a springing catch at A, which stays the wheel after every stroke at X. Lastly, there is a pin fixed in the circumference of the wheel at Z, which, by pressing the tail of a hammer, and letting it go again, causes a bell to sound after every revolution of the wheel, and gives notice that the glass must be turned a little about its centre. It is easy to understand, that another piece of wheel-work, having three or four indexes, whose revolutions are in decimal progression, may be fixed to the block H, and impelled by the strokes of the board LL; by which means, without any trouble of counting, one may be informed how many strokes go to polish a glass. A glass five or six inches broad requires about 3000 strokes upon each surface to bring it to perfection. You must carefully examine the middle of the glass opposite to the blacking, whether any place appears darkish or of an ash-colour; or whether any small spots appears by an oblique reflection of the light of a candle, or of a small beam of light let into a dark room; for the other parts of the glass will appear perfectly fine much sooner than the middle.

After the glass has been sufficiently polished, let the stone, the cloth, and the cement, be warmed over a pan of charcoal, till the cement grows so soft that the glass may be separated from it by a side-motion. Then, whatever cement remains upon the glass must be wiped off with a hot cloth dipped in oil or tallow, and last of all with cleaner cloths. Then if it does not appear perfectly polished, (for we are often deceived in this point), the work must be repeated again, by glueing the glass to the plate as before; then it must be wiped very clean, and made a little rough, as we said before. We must also lay a new fund, or coat, upon the tool, if the old one be spoiled; provided no other glass has been polished in the tool in the mean time. The old fund may be washed off from the tool with a little vinegar. Lastly, take care always to choose the thickest and clearest pieces of glass, to avoid a great many difficulties that arise from the unequal pressure in polishing.

§ 3. To Centre an Object-glass.

A circular object-glass is said to be truly centered when the centre of its circumference is situated in the axis of the glass, and to be ill centered when the centre of the circumference lies beside the axis. Thus, let d be the centre of the circumference of an object-glass abc ; and suppose e to be the point where its axis cuts its upper surface. If the points d and e do not coincide, the glass is ill centered. Let afg be the greatest circle that can be described about the centre e ; and by grinding away all the margin without this circle, the glass will become truly centered. The best method for finding the centre e which lies in the axis of the glass, according to Dr Smith, is as follows.

Let a couple of short cylindrical tubes be turned in wood or brass, and let the convexity of the narrower be so fitted to the concavity of the wider as just to turn round in it with ease, but without waddling; and let

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How to
know when
a glass is
truly centered.
Fig. 2.

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How to
correct the
errors.

the planes of the bases of the tubes be exactly perpendicular to their sides. Place the base of the narrower tube upon a smooth brass plate or a wooden board of an equal thickness; and with any sharp-pointed tool describe a true circle upon the board round the outward circumference of the base; and upon the centre of this circle, to be found when the tube is removed, describe a larger circle upon the board. These two circles should be so proportioned, that the one may be somewhat greater, and the other somewhat smaller, than any of the glasses intended to be centered by them. Then, having cleared out all the wood within the inner circle, put the end of the tube into this hole, and there fasten it with glue, so that the base of the tube may lie in the surface of the board: then, having fixed the wider tube very firmly in a hole made in a window-shutter, and having darkened the room, lay the glass to be centered upon the board fixed to the narrower tube; and having placed the centre of it as nearly as you can guess over the centre of the hole, fix it to the board with two or three lumps of pitch, or soft cement, placed at its circumference. Then put the narrower tube into the wider as far as it can go, and fix up a smooth screen of white paper to receive the pictures of objects that lie before the window; and when they appear distinct upon the screen, turn the inner tube round upon its axis; and if the centre of the glass happens to be in this axis, the picture will be perfectly at rest upon the screen; if not, every point of it will describe a circle. With a pencil mark the highest and lowest places of any one circle, described by some remarkable point in that part of the picture which appears most distinct; and when this point of the picture is brought to the highest mark, stop the circular motion of the tube, and keeping it in that position depress the object-glass till the point aforesaid falls exactly in the middle between the two marks. Then turn the tube round again, and the point of the picture will either rest there, or will describe a much smaller circle than before; which must be reduced to a quiescent point by repeating the same operation. The centre of refraction of the glass will then lie in the axis of the tube, and by consequence will be equidistant from the circumference of the large circle described upon the board fixed to it. Now to describe a circle upon the glass *fgb* about its centre of refraction, let a long slender plate of brass *acb* be bent square at each end, as represented in the figure, leaving a piece in the middle equal in length to the diameter of the large circle *adbe* that was described upon the board; and let the square ends of the plate be filed away, so that a little round pin may be left in the middle of each. Then, having laid it over the glass, along any diameter of the large circle *adbe*, make two holes in the board to receive the pins *a* and *b*; and find the centre of this circle upon the long plate. Then upon the centre *c*, describe a circle as large as you can, upon the glass underneath, with a diamond-pointed compass, and grind away all the margin as far as this circle *fik*, in a deep tool for grinding eye-glasses; and then the glass will be truly centered. If the pitch or cement be too soft to keep the glass from slipping, while the circle is describing, it may be fixed firmer with wax or harder cement.

Fig. 3. represents a section of the object-glass *klm*, of the board *ab*, and of the tubes *cd* and

hi, and of the window-shutter *no*. Imagine the plane of this section, or of the scheme, to pass through *e*, a point in the glass which keeps its place while the rest are turning round it by the motion of the tube. Let it also pass through *l* the centre of refraction in the glass, and cut an object in the line *PQR*; then let a pencil of rays flowing from any point *Q* be collected to the focus *q* upon the screen *ST*; and the points *Q, l, q*, will be in a straight line described by the axis, or principal ray of the pencil. Draw *Q, c, f*, cutting the screen in *f*; and while the tube is turning round, the line *Q, l, q* will describe a conical surface whose axis is the fixed line *Q, e, f*; and therefore the focus *q*, or image of the point *Q*, will describe a circle *g x g* about *f*, to be found upon the screen by bisecting the interval *g x* between the highest and lowest points of the circle. Now, as *f* is the centre of this circle, so *e* is the centre of another circle described by *l*: therefore by depressing the glass *k l* along the surface of the board *ab*, till the image *q* falls upon the mark *f*, the point *l* will be depressed to *e* the centre of motion; and then it will be in the axis of the tube, and consequently equidistant from the circumference of the circle described on the board *ab*; and here it is plain that the image *q* will be at rest in the point *f*. It is not necessary for the accuracy of the practice, that the point *Q* should be in the axis of the glass. For in fig. 7. (Plate CCXXII.) if the glass *KLM* be turned about its axis *Q, l, g*, the image *p* of any collateral point *P* will remain at rest; because the points *PL* are at rest, and the axis *PL, p* of the oblique pencil is a straight line.

The chief advantage of having a glass well centered is this, that the rays coming through any given hole, whose centre coincides with the axis of the glass, will form a distincter image than if that centre lay beside the axis; because the aberrations of the rays from the geometrical focus of the pencil, are as the distances of their points of incidence from the centre of refractions in the glass.

If the picture be received upon the unpolished side of a piece of plane glass, instead of the paper *ST*, its motion may be discerned more accurately by viewing it from behind through a convex eye-glass; as in a telescope where cross hairs are usually strained over a hole put into the place of the rough glass. Therefore as object-glasses are commonly included in cells that screw upon the end of the tube, one may examine whether they be pretty well centered, by fixing the tube, and by observing, while the cell is unscrewed, whether the hairs kept fixed upon the same lines of an object seen through the telescope.

§ 4. Of the Composition of the Metals for the Speculum of Reflecting Telescopes.

THE properties required in the metal for the speculum of a reflecting telescope are, whiteness, hardness, and immunity from rust, or at least that it may be as little liable to tarnish as possible. Various compositions have been recommended; but the best is that published by Mr Mudge in the Phil. Transl. for 1777. His metal is a composition of copper and tin, in the proportion of two pounds of the former to 14½ ounces of the latter. If the proportion of tin was increased only by a single half ounce, the metal became so hard that

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Mr
Mudge's
composition
for specu-
la.
it.

OPTICS.

Fig. 1.

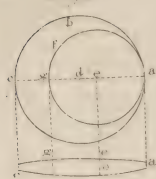


Fig. 2.

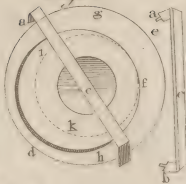


Fig. 4.

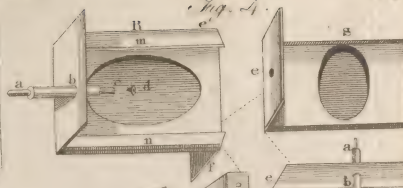


Fig. 3.

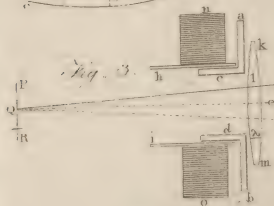


Fig. 9.

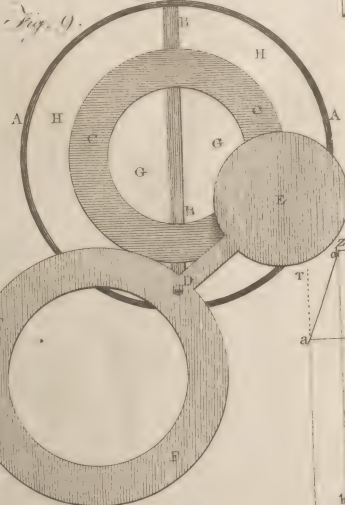


Fig. 8.

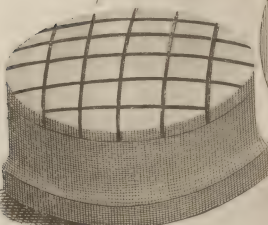
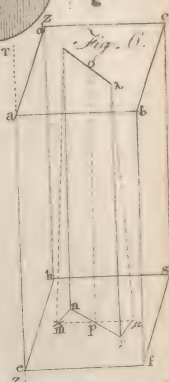
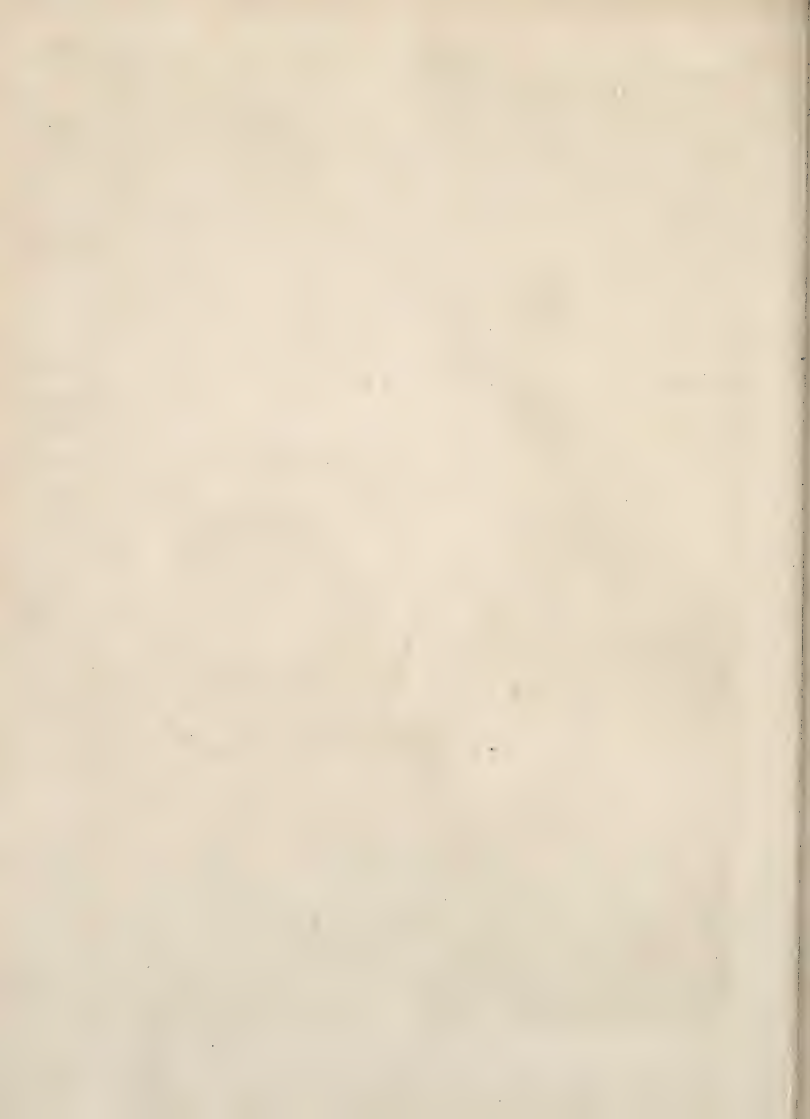


Fig. 5.



Fig. 6.





it could not be polished. Nevertheless he tells us, that one Mr Jackson, a mathematical instrument-maker, used the tin in as large a proportion as one third of the whole. This indeed gives the metal its utmost whiteness, but at the same time renders it so exceedingly hard, that the finest washed emery will not cut it without breaking up its surface; and the common blue stones used in grinding specula will not touch it. With great pains, however, Mr Jackson found a stone which would work upon this metal, and was at the same time of a texture sufficiently fine not to injure its surface; but what this stone was, or where it was to be found, he would not discover.

Another very essential property in the metal for specula is its compactness; and in this every one of those formerly tried was deficient; neither was Mr Mudge able to remove this defect till after a great many experiments. Sometimes, indeed, he says that he succeeded in casting a single metal, or perhaps two or three, without this imperfection; but most frequently he was unsuccessful, without his being in any degree able to assign a reason. The pores were so very small, that they were not perceptible when the metal had received a good face and figure upon the hones, nor till the last and highest polish had been given: then it frequently appeared as if dusted over with millions of microscopic pores, which were exceedingly prejudicial in two respects; for, first, they became in time a lodgement for a moisture which tarnished the surface; and, secondly, on polishing the speculum, the putty necessarily rounded off the edges of the pores, in such a manner as to spoil a great part of the metal, by the loss of as much light and sharpness in the image as there were defective points of reflection in the metal; and, to add to the misfortune, this fault was not discovered till a great deal of pains had been taken in grinding, and even polishing the speculum; which was at once rendered useless by this mortifying discovery.

At last Mr Mudge was extricated from these difficulties by accident. Having made a great number of experiments, and entirely exhausted his copper, he recollected that he had some metal which was preserved out of curiosity, and was part of one of the bells of St Andrew's which had been recast. This he melted with a little fresh tin, and, contrary to his expectation, it turned out perfectly free from pores, and in every respect as fine a metal as could be desired. At first he could not account for this success, but afterwards discovered it by reflecting on the circumstances of his process. He had always melted the copper first, and, when it was sufficiently fused, he added the proportional quantity of tin; and as soon as the two were mixed, and the scoria taken off, the metal was poured into the moulds. He now began to consider that putty was calcined tin, and suspected that the excessive heat which copper necessarily undergoes before fusion, was sufficient to reduce part of the tin to this state of calcination, which therefore might fly off from the competition in the state of putty, at the time the metal was poured out. On this idea he furnished himself with some more Swedish copper and grain-tin. The former he melted as usual, and mixed the tin along with it, casting the mixture into an ingot. This was porous, as he had expected; but after a second

fusion, it became perfectly close; nor, after this, did he ever meet with the above-mentioned imperfection in a single instance. All that is necessary to be done, therefore, in order to procure a metal with the requisite properties for a speculum, is to melt the copper and tin in the above-mentioned proportions; then, having taken off the scoria, cast it into an ingot. This metal must be a second time melted to cast the speculum; but as it will fuse with a small heat in this compound state, it should be poured off as soon as melted, giving it no more heat than is absolutely necessary. It must be observed, however, that the same metal, by frequent melting, loses something of its hardness and whiteness; when this is the case, it becomes necessary to enrich that metal by the addition of a little tin, perhaps of half an ounce to a pound. And indeed, when the metal is first made, if, instead of adding the $14\frac{1}{2}$ ounces of tin to the copper all at once, about an ounce of the former is reserved, and added to it in the second melting, the composition will be more beautiful, and the grain much finer. That the metal may have a good surface, it is necessary, before it is poured off, to throw into the crucible a spoonful of charcoal-dust; immediately after which the metal must be stirred with a wooden spatula, and poured into the moulds.

§ 5. *Of preparing the Moulds; Grinding, Casting, and Polishing, the Metal.*

For this purpose Dr Smith prescribes the following method. "Having in the first place considered of what length one would propose the instrument to be, and consequently what diameter it will be necessary to make the give to the large speculum, for which there are ample instructions by Sir Isaac Newton's table in the Philosophical Transactions aforesaid, allowing about an inch more than the aperture in the table for the false figure of the edges, which very often happens; I say, having determined these things, take a long pole of fir deal, or any wood, of a little more than double the length of the instrument intended, and strike through each end of it two small steel points, and by one of them hang up the same against a wall perpendicularly; then take two pieces of thin plate-brass well hammered, a little thicker than a sixpence; these may be about an inch and a half broad, and let their length be in respect of the diameter of the speculum as 3 to 2, viz. if the speculum be 8 inches diameter, these may be about 12. Fix each of these strongly with rivets between two thin bits of waincot, so that a little more than a quarter of an inch in the breadth may stand out from between the boards. Then fix up these pieces horizontally against the wall under your pole; and therewith, as with a beam compass, strike an arch upon each of them: then file each of them with a smooth file to the arch struck, so as one may be a convex and the other a concave arch of the same circle. These brasses are the gauges to keep the speculum, and the tools on which it is ground, always to the same sphere. And that they may be therefore perfectly true to each other, it is necessary to grind them with fine emery one against the other, laying them on a flat table for that purpose, and fixing one of them to the table.

"When the gauges are perfectly true, let a piece of wood be turned about 2 tenths of an inch broader for the upper than the intended speculum, and somewhat thicker, ^{which}

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which it is best to cast in no case less than 2 tenths of an inch thick, and for specula of 6, 8, or 10 inches broad, this should be at least 3 or 4 tenths thick when finished. This board being turned, take some common pewter, and mix with it about $\frac{1}{10}$ of regulus of antimony; and with that wooden pattern cast one of this pewter, which will be considerably harder than common pewter. Let this pewter pattern be truly turned in a lathe, and examined by means of the gauges aforesaid, as a pattern for casting the specula themselves; and take care when it is turned that it be at least $\frac{1}{10}$ of an inch thicker, and about $\frac{1}{10}$ of an inch broader, than the speculum intended to be cast therefrom.

"The manner of making the moulds for casting is now to be explained; and will serve for a direction as well for casting this pewter pattern, as afterwards for casting thereby the speculum itself. The flasks had best be of iron, and must be at least two inches wider every way than the speculum intended. In each flask there should be the thickness at least of one inch of sand. The casting-sand which the common foundries use from Highgate, will do as well as any; and any sand will do which is mixed with a small proportion of clay to make it stick. The sand should be as little wet as may be, and well beaten but not too hard. The ingates should be cut so as to let the metal flow in, in four or five streams, over the whole upper part of the mould; otherwise whatever pores happen in the metal will not be so equally dispersed as they should be over the whole face of the metal, these pores generally falling near the ingate streams. Let the flasks dry in the sun for some hours, or near a very gentle fire; otherwise they will warp, and give the speculum, when cast, a wrong figure. For besides saving the trouble in grinding, it is best on many accounts to have the speculum cast of a true figure; and it is for this reason, that it is best to cast it from a hard pewter pattern, and not from a wooden one as foundries usually cast."

With regard to the proper metal, opticians have been greatly at a loss, till of late that Mr Mudge has discovered a composition which answers every purpose as well as can be expected, and of which an account hath been already given. "The metal being duly cast, the surface of it is to be ground quite bright upon a common grindstone; keeping it, by means of your convex gauge, as near the figure as may be. When all the outward surface and sand-holes, false parts, and inequalities, are ground off, then provide a good thick stone; a common small grindstone will do very well. Let its diameter be to the diameter of the speculum as 6 to 5; with another coarse stone and sharp sand or coarse emery rub this stone till it fits the concave gauge; and then with water and coarse emery at first, and afterwards with finer, rub your speculum upon this stone until it forms itself into a true portion of a sphere fitting your convex gauge. A different method of moving the metal upon the stone will incline it to form itself somewhat of a smaller or larger sphere. If it be struck round and round, after the manner of glass-grinders, the stone will wear off at the outsidings, and the metal will form itself into the portion of a less sphere. If it be struck cross and cross the middle, it will flat the stone, and become somewhat of a larger

sphere. There should be used but very little emery at a time, and it ought to be frequently changed; otherwise the metal will always be of a smaller sphere than the stone, and will hardly take a true figure, especially at the outside. For the better grinding the metal, it is necessary, that this stone should be placed firm upon a strong round board fixed firmly on a post to the floor, as is usual with glass-grinders; and the same table or pillar will serve for the further grinding and polishing the speculum.

"When the metal is cast and rough-figured, which should be done with taking off as little of the surface of the metal as possible, (because that crust seems generally to be harder and more solid than the inner parts) the sides and back of it should be smoothed and finished; lest the doing that afterwards should make the metal cast, and spoil the figure of the fore-side.

"A round brass plate must be cast of sufficient breadth and thickness (for a speculum of six inches in diameter Mr Hadley used a brass plate 8 or 9 inches broad, and half an inch thick.) Let one side be turned to the concavity you design your speculum to have, on the other side let it have such an handle fastened as may make it easily manageable. This handle should be as short as conveniently it can, and be fixed to the plate's back rather by some other method than either by screwing it into a hole in the metal, or by a broad shoulder screwed against the back of it, for fear of bending the plate. Have ready a round marble of about $\frac{1}{4}$ or $\frac{1}{2}$ broader than the brass plate, and an inch or an inch and a quarter thick: let this be cut by a stone-cutter to the same convexity on one side as the concavity of the plate, and then grind it with the plate and emery till all the marks of the chisel are out. This marble is to be covered with pieces of the finest blue hone or whetstone, choosing those that are nearest of a breadth and thickness; but chiefly those that when wetted appear most even and uniform in their colour and grain. They are to be cut into square bits; and these, having each one side ground concave on the convex marble with emery or fine sand, are to be fixed close down on it with some tough and strong cement in the manner of a pavement, leaving a space of a small straw's breadth between each; their grain being likewise placed in an alternate direction, as represented in the figure. I choose rather to disperse the squares that come out of the same whetstone, than to keep them together. They must then be reduced to one common convex surface to fit the brass plate; and if the cement happen to rise any where between them, so as to come up even with the surface, it must be dug out; and so, from time to time, as often as the hones wear down to it. Upon these square pieces of whetstone the last figure is to be given to the speculum.

"Besides these, there will be wanted for the last polish, either a very thick round glass plate, (its diameter being about the middle size between that of the brass tool and the speculum itself,) or if that cannot be procured of near half an inch in thickness, a piece of true black marble of the evenest grain and free from white veins or threads, may do in its stead. This glass or marble must be figured on one side to the brass tool likewise, and is to serve for finishing of the polish

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polishing
the metal

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fig. 9.

Mechanism of Optical Instruments of the speculum, when covered with sarcenet as shall be directed.

“ A smaller brasa or metal plate of the same concavity with the larger will be useful, as well to help to reduce the figure of the hones whenever it appears to be too convex, as to serve for a bruifer to rub down any gritty matter happening to be amongst your putty before you put the speculum on the polisher, when you renew the powder. Any of the speculums which prove bad in cutting, will serve for this purpose.

“ When all is thus far ready, let the marble with the blue hones be fixed in such a manner that it may be often washed during your work, by throwing upon it about half a quarter of a pint of water at a time without inconvenience. Then place the brasa tool on the hone pavement; and rub it backwards and forwards with almost a direct motion; yet carrying it by turns a little to the right and left, so as to go a little over the edges of the pavement every way, regularly turning the tool on its own axis, and also changing the direction of the stroke on the hones. This continue, keeping them always very wet, till you have got out all the rings remaining in the plate from the turning, and the blackness from grinding the marble or glass in it; and, towards the latter end, often washing away the mud which comes from the whetstones. When this is done, lay the brasa tool down, and in it grind again with fine emery the glass or marble designed for the last polisher, giving it as true a figure as possible.

“ Choose a piece of fine sarcenet as free from rows and great threads as you can. Let it be three or four inches broader than the glass or marble; and turn down the edges of the sarcenet round the sides of the glass, &c. Strain it by lacing it on the backside as tight and smooth as you can, having first cleared it of all wrinkles and folds with a smooth iron, and drawn out the knots and gouty threads. Then wet it all over as evenly as you can with a pretty strong solution of common pitch in spirit of wine; and when the spirit is dried out, repeat the same; and if any bubbles or blisters appear under the sarcenet, endeavour to let them out with the point of a needle. This must be repeated till the silk is not only stuck every where firmly down to the glass or marble, but is quite filled with the pitch. A large painter's pencil, made of squirrel's hair, is of use for spreading this varnish equally on the silk, especially when it begins to be full. It must then be set by for some days, for the spirit to dry well out of it, and the pitch to harden, before any thing more be done to it. If you do not care to wait so long, the pitch may be melted into the silk without dissolving it in spirits. In order to this, strain a second thin silk over the first, but you need not be curious in the choice of it; and having heated all together as hot as you think the silk or glass will safely bear, pour on it a little melted pitch (first strained through a rag) so much as you judge sufficient to fill both silks; it must be kept hot for some time till the pitch seems to have spread itself evenly all over. If you cannot get it to sink all into the upper silk, but it stands above it any where, it is a sign that there was too much pitch laid on, which should be taken away in those places while it remains liquid, with a hot rag pressed down on it. When all is cold again, strip off the outward silk, and cut away the useless loose edges

of the inward. To take off the superfluous pitch where it lies too thick, and reduce the whole to a regular surface, it must be rubbed in the brasa tool with a little soap and water, till they are coloured of a pretty deep brown with the pitch; then wash them away, and repeat the same with more soap and water, till the weaving of the silk appears every where as equally as you can make it. As this work takes up some time, you may expedite it by putting a few drops of spirit of wine to the soap and water (which will help them to dissolve and wear away the pitch somewhat faster till it comes towards a conclusion; and if there are any places where the pitch lies very thick, you may scrape it away with a sharp knife.

This polisher must be carefully kept from all dust and grit, but particularly from emery and filings of hard metals, and therefore should not be used in the place where the others come. After they have served a good while, they are more apt to sleek the metals than at first; to prevent which, their surfaces may be taken off by rubbing them with soap and water in the tool as before, and then striking them over once or twice with the abovementioned solution of pitch with a pencil, proceeding as before; only that you must not now put any spirit to your soap and water, nor will you need to change them above once or twice.

“ You may now begin to give the figure to your speculum on the hones, rubbing it and the brasa tool on them by turns, till both are all over equally bright; having first fixed on to the middle of the back of your speculum a small and low handle, with only pitch strained through a rag. For of all cements, that seems the least apt to bend the metals in sticking these handles, &c. on them.

“ The polisher being fixed likewise in a proper manner for your work, rub either the metal itself, or rather the before-mentioned bruifer, being first also figured on the hones, with a little putty, washed very fine, and fair water, till it begins to shew some polish. Then if you find it takes the polish unequally, that is, more or less about the edges than in the middle, it is a sign the brasa tool and metal, &c. are more or less concave than to answer the convexity of the polisher; and must be reduced to the curvature of this, rather than to attempt an alteration in the figure of the polisher, which would be a much more difficult as well as laborious work. If the speculum appears too flat, the larger brasa tool must be worked on the hones for some time, keeping its centre near their circumference, with a circular motion; but concluding for four or five minutes with such a motion as was before described. Then figure the metal anew on the hones, and try it again on the polisher as before. If the metal be too concave, the surface of the hones may be flatted by rubbing the smaller brasa plate, or the before-mentioned ill-cut metal, on the middle of them; with a direct but short stroke, so as but just to reach over their circumference with the edge of it. Then the larger brasa is to be worked on them in the same manner; and last of all the metal to be polished. When you find the brasa tool and hones, &c. answer the curvature of the polisher, you may then examine the truth of the figure of the speculum more strictly, to avoid the loss of time and labour in finishing its polish while the figure is imperfect.

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fig. 10.

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Method of
examining
the true fi-
gure of the
speculum.

"Place the speculum in a vertical posture on a table about $3\frac{1}{2}$ or 4 feet from the floor. On another table set a candle whose flame should be about the level of the middle of the speculum, and very near the centre of its concavity. About $\frac{1}{2}$ an inch before the flame, place a flat tin, or thin brass, plate about 3 inches broad, but 4 or 5 high, having several holes about the middle, of different shapes and sizes; some of them as small as the point of the sharpest needle will make them, the biggest about the size of a large mustard-seed: darken the room, and move this candle and plate about on the table, till the light from the brightest part of the flame, passing through some of the larger holes to the speculum, is reflected back so as to form the images of those holes close without one of the side-edges of that thin plate.

Those largest images in this case will be visible, (although the speculum have no other polish than what the hones give it), when received on a thick white card held close to that edge of the plate, if the back of the card be either blacked or so shaded that the candle may not shine through it, and the eye be also screened from the candle's direct light. If any difficulty happens in discerning them, the plate may be removed, and the image of the whole flame will be easily seen. Have ready an eye-glass whose focal distance may be something greater than the double of that of the eye-glass you intend for the instrument when finished: you may try several at your discretion. Let this be supported by a small stand moveable on the table, and capable of raising and sinking it as the height of the flame requires, and of turning it into any direction. By means of this stand, bring the eye-glass into such a position, that the light from some of the holes, after its reflection from the speculum, may be received perpendicularly on its surface; and that its distance from the speculum be such, that the reflected images of the holes may be seen distinctly through it, near the edge of the thin plate, by the light coming immediately from the speculum: guide the candle and thin plate with one hand, and the stand carrying the eye-glass with the other, till you have got them into such a situation, that you see distinctly at the same time, through the eye-glass, the edge of the thin plate, and the image of one of the holes close to it. Measure the exact distance of the middle of the speculum from the thin plate directly against the flame, and also from the edge close to which you see the image of the hole. If these measures are the same, set it down as the exact radius of concavity of your speculum, and proper curvature for any that are to be polished on your polishers, though that will allow some latitude: if the measures aforesaid differ, take the mean between them.

"You will now also judge of the perfection of the spherical figure of your metal by the distinctness with which you see the representations of the holes, with their raggedness, dusts, and small hairs sticking in them; and you will be able to judge of this more exactly, and likewise to discover the particular defects of your speculum, by placing the eye-glass so as to see one of the smallest holes in or near its axis; and then by moving the eye-glass a very little forward towards the speculum, and pulling it away, by turns, letting the candle and plate stand still in the mean time. By this means you will observe in what manner the light from the metal comes to a point, to form the

images, and opens again after it has past it. If the area of the light, just as it comes to or parts from the point, appears not round, but oval, squarish, or triangular, &c. it is a sign that the sections of the specular surface, through several diameters of it, have not the same curvature. If the light, just before it comes to a point, have a brighter circle round the circumference, and a greater darkless near the centre, than after it has crossed and is parting again; the surface is more curve towards the circumference, and flatter about the centre, like that of a prolate spheroid round the extremities of its axis; and the ill effects of this figure will be more sensible when it comes to be used in the telescope. But if the light appears more hazy and undefined near the edges, and brighter in the middle before its meeting than afterwards, the metal is then more curve at its centre and less towards the circumference; and if it be in a proper degree, may probably come near the true parabolic figure. But the skill to judge well of this, must be acquired by observation.

"In performing the foregoing examination, the image must be reflected back as near the hole itself as the eye's approach to the candle will admit of, that the obliquity of the reflection may not occasion any sensible errors: in order to which, the eye should be screened from the candle; and the glaring light, which may disturb the observation, may be still more effectually shut out, by placing a plate, with a small hole in it, in that focus of the eye-glass which is next the eye. *A* is the speculum, *B* the candle and plate with the small holes, *C* the cell with the eye-glass and plate be- hind it. Fig. 10.

"Instead of the flame of the candle and plate with small holes, I sometimes made use of a piece of glass thick stuck with globules of quicksilver, strained thro' a leather, and allowed to fall on it in a dew; placing this glass near a window, and the speculum at a distance on the side of the room, being itself and every thing about it as much in the dark as can be. The light of the window reflected from the globules of mercury, appearing as so many stars, serves instead of the small holes, with this advantage, that the reflection from the metal may be very near at right angles.

"If the figure of the metal appears not satisfactory, the hones must be worked with the brasts tool and water for 2 or 3 minutes with the motion, &c. first directed; then work the metal on them with the like motion, and such length of the stroke as may carry the edge of it about $\frac{1}{2}$ or $\frac{1}{3}$ of its diameter beyond that of the hone pavement each way; carry it likewise by turns to the right and left, to about the same distance. Continue this about 5 minutes, not pressing the metal down to the hones with any more than its own weight, and observe that the oftener the mud is washed away, the more truly spherical the figure of the speculum will generally be: but the leaving a little more of this mud on the stones has sometimes seemed to give the metal a parabolic figure. I have likewise given it the same, by concluding with a kind of spiral motion of the centre of the metal, near the circumference of the hones, in the manner represented in fig. 11. for about half a minute.

"If after several trials the metal appears to have always the same kind of defect, and answering to the same

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ing the e-
rors.

Mechanism fame particular part of the metal, it is a sign of a different hardness in its several parts, which will make it very difficult to bring that speculum to perfection. In working the tools or metals on the hones, there will often appear little spots in them, much blacker and harder than the rest; these must be dug out as fast as they appear.

"When the figure is to your mind, you may proceed to finish the polish on the facenet with very little putty, and that diluted with a great deal of water. Before you put the putty and water on it, observe, by holding it very obliquely between your eyes and the light, if it have any lifts or stripes across it, which appear more glossy than the rest. If it be so, let the motion of the metal in polishing be directly athwart these lifts, and not along with them, nor even circular. In other respects you may observe the same directions as were before given for its motion on the hones; not forgetting, after every 15 or 20 strokes, to turn it on its axis about $\frac{1}{4}$ or $\frac{1}{2}$ of a revolution. As the polisher grows dry, you will find the metal stick to it more and more stiff; at which time it both polishes faster and with a better gloss: only take care that it grows not so dry as for the metal to take hold of the facenet and cut it up, or for the pitch and putty to fix in little knobs here and there on it; which, if it happen, will presently spoil the figure. As fast therefore as the facenet appears to be growing dry at any of its edges, touch the place with the end of a feather dipped in clean water: you may use the same putty at least half an hour. As often as you change it, wash the old clean away, and rub the new about first with your bruiser, to see if there be any gritty or gross particles in it, and rub them away for fear of scratching the metal; then laying down the edge of the speculum a little way on the edge of the polisher, where it is well covered with water, slide it on the middle, and then proceed. The less putty you use at a time, the slower the work will advance; but if you use too much, it will spoil a little of the figure round the edges. It will not want any considerable force to press it down; but if it be of 5 or 6 inches diameter or more, it will be very laborious to go through the polish without some kind of machine."

Mr Mudge is of opinion that all this troublesome method is entirely unnecessary, and of the same opinion is an anonymous French author who wrote on this subject in the year 1738. The latter tells us what is certainly agreeable to reason and experience, that the more complicated the machines are by which we attempt to accomplish any purpose, the more liable we are to error by reason of their perpetual tendency to go wrong, and the necessary multiplication of inaccuracy is a complicated motion. Four tools, according to Mr Mudge, are all that are necessary; viz. the rough grinder to work off the rough face of the metal; a brass convex grinder, on which the metal is to receive its spherical figure; a bed of hones, which is to perfect that figure, and to give the metal its smooth fine face; and a concave tool or bruiser, with which both the brass grinder and the hones are to be formed. A polisher may be considered as an additional tool; but as the brass grinder is used for this purpose, and its pitted surface is expeditiously and without difficulty formed by the bruiser, the ap-

paratus is therefore not enlarged.

The tool by which the rough surface of the metal is rendered smooth and fit for the hones, is best made of lead stiffened with about a sixth part of tin. This tool should be at least a third more in diameter than the metal which is to be ground; and for one of any size, not less than an inch thick. It may be cemented upon a block of wool, in order to raise it higher from the bench. This leaden tool being cast, it being fixed in the lathe, and turned as true as possible by the gauge to the figure of the intended speculum, making a hole or pit in the middle for a lodgement to the emery, of four inches; when this is done, deep grooves must be cut across its surface with a graver, as is represented fig. 7. These grooves will serve to lodge the emery, and by their means the tool will cut a great deal faster. There is no reason to fear any alteration in the convexity of this tool by working the metal upon it; for the emery will bed itself in the lead, and so far arm the surface of it, that it will preserve its figure, and cut the metal very fast. Any kind of low handle, fixed on the back of the metal, with soft cement, will be sufficient; but it should cover two thirds of its back, to prevent its bending. "This way of working (says Mr Mudge) will cut the metal faster, and with more truth, than the method described by Dr Smith; for should the surface and rough parts be attempted to be ground off by a common grindstone by hand, though you did it as near the gauge as possible, yet the metal would be so much out of truth when applied to the succeeding tool, that no time would be saved by it." For this purpose Mr Mudge used to employ a common labourer, who soon acquired such dexterity at working upon the tool, that in two hours time he would give a metal of four inches diameter so good a face and figure as even to fit it for the hones.

When all the sand-holes and irregularities on the face of the metal are ground off, and the whole surface is smooth and regularly figured, the speculum is then ready for the brass grinder, and must be laid aside for the present.

The brass grinding-tool is formed in the following manner. Procure a round stout piece of Hamburgh brass, at most a sixth part larger than the metal to be polished; and let it be well hammered, by the assistance of the gauge, into a degree of convexity suitable to the intended speculum. Having done this, scrape and clean the concave side so thoroughly, that it may be well tinned all over; then cast upon it, after it has been pressed a proper depth into the sand, the composition of tin and lead above-mentioned, in such quantity, that it may, for a speculum of four inches diameter, be at least an inch and half thick, and with a base considerably broader than the top, in order that it may stand firmly upon the bench hereafter to be described. This being done, it must be fixed and turned in the lathe with great care, and of such a convexity as exactly to suit the concave gauge. More care will be necessary in forming this tool than the former, especially that no rings be left in turning; nor will the succeeding hone-tool require so much exactness, as any defects in turning will, by a method hereafter mentioned, be easily removed; but any inequality or want of truth in the brass tool will occa-

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sion a great deal of trouble before it can be ground out by the emery. This tool must have a hole, somewhat less than that in the metal to be worked upon it, in the middle, quite through to the bottom. When this tool is finished off in the lathe, its diameter should be one-eighth wider than the metal.

The hones should be of the best sort of those recommended by Dr Smith. They should be cemented in small pieces (in a kind of pavement, as hath been already mentioned) upon a thick round piece of marble, or metal made of lead and tin in the proportions above directed, in such a manner, that the lines between the stones may run straight from one end to the other; so that placing the teeth of a fine saw in each of these divisions, they may be cleared from one end to the other of the cement which rises between the stones. This bed of hones should be at least one-fourth larger than the metal which is to be ground upon it; but there is no necessity for turning the metal on which the hones are cemented to the same convexity with the gauge. As soon as the hones are cemented down, and the joints cleared by the saw, this tool must be fixed in the lathe, and turned as exactly true to the gauge as possible; which done, it must be laid aside for the present. The next tool to be made is the bruifer.

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The bruifer should be made of thick stout brass like the former, perfectly found, about a quarter of an inch thick, and hammered as near to the gauge as possible. It should then be scraped, cleaned, and tinned on the convex side, as the former tool was on the concave, and the same thickness of lead and tin cast upon it. The general shape of this should differ from the former; for as that increased in diameter at the bottom for the sake of standing firmly, so this should be only as broad at bottom as at top, as it is to be used occasionally in both those positions. When this tool is fixed in the lathe, and turned off concave to the convex gauge with great truth likewise, its diameter ought to be the middle size between the hones and the polisher.

Having with the lathe roughly formed the convex brass grinder, the bed of hones, and the concave bruifers, the convex and concave brass tools and the metal must be wrought alternately and reciprocally upon each other with fine emery and water, so as to keep them as nearly to the same figure as possible; in order to which, some washed emery must be procured. This is best done by putting it into a vial, which must be half filled with water and well shaken up, so that, as it subsides, the coarsest may fall to the bottom first, and the finest remain at the top; and whenever fresh emery is laid upon the tools, the best method (which we should also observe with the putty in polishing) will be, to shake gently the bottle, and pour out a small quantity of the turbid mixture.

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lum, the
brass tool,
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bruifer, to-
gether.

The tools being now all ready, upon a firm post in the middle of a room, you are to begin to grind the brass convex tool with the bruifer upon it, working the latter crosswise, with strokes sometimes across its diameter, at others a little to the right and left, and always so short, that the bruifers may not pass above half an inch within the surface of the brass tool either way, shifting the bruifer round its axis every half dozen strokes or thereabout. You must likewise,

every now and then, shift your own position, by walking round, and working at different sides of the brass tool: at times the stroke should be carried round and round, but not much over the tool: in short, they must be directed in such a manner, and with such equality, that every part of both tools may wear equally. This habit of grinding, as well as the future one of polishing, will soon be acquired. When you have wrought in this manner about a quarter of an hour with the bruifer upon the tool, it will be then necessary to change them, and, placing the bruifer upon its bottom, to work the convex tool upon that in the same manner.

When, by working in this equable manner alternately with the bruifer and tool, and occasionally adding fresh emery, you have nearly got out all the vestiges of the turning tool, and brought them both nearly to a figure, it will then be time to give the same form to the metal. This must be done by now and then grinding it upon the brass tool with the same kind of emery; taking care, however, by working the two former tools frequently together, to keep all three exactly in the same curve. The best kind of handle for the metal is made of lead, a little more than double its thickness, and somewhat less in diameter, of about three pounds weight, with a hole in the middle, (for reasons to be afterwards shown), a little larger than that in the metal: this handle should be cemented on with pitch. The upper edge of this working should be rounded off, that the fingers may not be hurt: and a groove about the bigness of a little finger be turned round just below it, for the more conveniently holding and taking the metal off the tools.

When the bruifer, brass tool, and metal, are all brought to the same figure, and have all a true good surface, the next part of the process is to give a correct spherical figure and a fine face to the metal upon the hones. It is necessary to observe, however, that the hones should be placed in a vessel of water, with which they should be quite covered for at least an hour before they are used; otherwise they will be continually altering their figure when the metal comes to be ground upon them. The same precaution is also necessary if you are called off from the work while you are grinding the metal; for, if they be suffered to grow dry, the same inconvenience will ensue.

In order to give a proper figure to the hones, and exactly suitable to that of the brass tool, bruifer, and metal, when the hones are fixed down to the block, some common flour emery (unwashed), with a good deal of water, must be put upon them, and the bruifer being placed upon the hones and rubbed thereon with a few strokes and a light hand, the inequalities of the stone will be quickly worn off; but, as a great deal of mud will be suddenly generated, it must be washed off every quarter of a minute with plenty of water. By a repetition of this two or three times, the hones (being of a very soft and friable nature) will be cut down to the figure without wearing or altering the bruifer at all. Tho' this business may be quickly done, and can be continued but for a few strokes at a time, it is absolutely necessary that those strokes be carried in the same direction, and with the same care, which was observed in grinding the former tools together.

As soon as the hones have received the general figure of the bruiser, and all the turning strokes are worn out from them, the emery must be carefully washed off; in order to which, it will be necessary to clear it from the joints with a brush, under a stream of water. The bruiser and metal must likewise be cleared in the same manner, and with equal care, from any lurking particles of emery.

The hones being fixed down upon the block, you now begin to work the bruiser upon them with very cautious, regular, short strokes, forward and backward, to the right and left, turning the axis of the bruiser in the hand, while you move round the hones by shifting your position, and walking round the block. The whole now depends upon a knack in working, which should be conducted nearly in the following manner. Having placed the bruiser on the centre of the hones, slide it in an equable manner forward and backward, with a stroke or two directly across the diameter, a little on one side, and so on the other. Then, shifting your position an eighth part round the block, and having turned the bruiser in your hand about as much, give it a stroke or two round and round, but not far over the edges of the hones, and then repeat the cross-strokes as before: those round strokes, which ought not to be above two or three at most, are given every time you shift your own position and that of the metals previous to the cross ones, in order to take out any stripes, either in the hones or bruiser, which may be supposed to be occasioned by the straight cross strokes. During the time of working, no mud must be suffered to collect upon the hones, so as to destroy the perfect contact between the two tools; and therefore they must every now and then be washed clean by throwing some water upon them. When, by working in this manner, all the emery strokes are ground off from the bruiser, and it has acquired a good figure and clean surface, you may then begin with the metal upon the hones, in the same cautious manner, washing off the mud as fast as it collects; though that will be much less now than when the bruiser was ground upon them. Every now and then, however, the bruiser must be rubbed gently and lightly upon the hones, which will, as it were, by sharpening them, and preventing too great smoothness, occasion them to cut the metal faster.

After having, by working in this manner, taken out all the emery strokes, and given a fine face and true figure to the metal, which will be pretty well known by the great equality there is in the feel while you are working, and by which an experienced workman will form a pretty certain judgement, you may then try your metal, and judge of its figure by the following more certain method.

Wash the hone pavement quite clean; then put the metal upon the centre of it, and give two or three strokes round and round only, not carrying, however, the edges of the metal much over the hones; this will take out the order of straight strokes: then, having again washed the hones, and placed the speculum upon their centre, with gentle pressure, slide it towards you, till its edge be brought a little over that of the hones; then carry it quite across the diameter as far on the other side, and having given the metal a light stroke or two in this direction, take it off the

tool. The metal being wiped quite dry, place it upon a table at a little distance from a window; stand yourself as near the window, at some distance from the metal, and looking obliquely on its surface, turn it round its axis, and you will see at every half turn the grain given by the last cross strokes flash upon your eye at once over the whole surface of the metal. This, says Mr Mudge, is as certain a proof of a true spherical figure, as the operose and difficult method described by Dr Smith: for as there is nothing soft or elastic either in the metal, or in the hones, this glare is a certain proof of a perfect contact in every part of the two surfaces; which there could not be, if the spheres were not both perfect and precisely the same. Indeed there is one accidental circumstance which affords its aid in this and other similar cases; namely, that a concave and convex surface ground together, though ever so irregular at first, (will, if the working be uniform and proper, consisting, especially at last, of cross strokes in every possible direction across the diameter) be formed into portions of true and equal spheres. Had it not been for this lucky necessity, it would have been impossible to have produced that correctness which is essential in the speculum of a good reflecting telescope by any mechanical contrivance whatever. For when it is considered, that the errors in reflection are four times as great as in refraction, and that the least defect in figure is magnified by the powers of the instrument, any thing short of perfection in the figure of the speculum would be evidently perceived by the want of distinctness in the performance.

Here, however, Mr Mudge observes, that he all along supposes, both in forming the tools, and at last in figuring the metal (and the same is to be observed in the future process of polishing), that no kind of pressure is used that may endanger the bending or irregularly grinding them: they should therefore be held with a light hand, and loosely between the fingers; and the motion given should be in a horizontal direction, with no other pressure than their own dead weight.

Having now finished the metal on the hones, and rendered it both in point of figure and surface fit for the last and most essential part of the process, viz. that of polishing, we shall now proceed to describe it as minutely as possible, though many little circumstances must necessarily be omitted, and can only be supplied by experience.

The polishing of the speculum is the most difficult and essential part of the process; and every experienced workman knows, to his vexation, that the most trifling error here will be sufficient to spoil the figure of his metal, and render all his preceding caution useless. On this occasion also Mr Mudge makes the following remarks on the method of polishing used by Hadley and Molyneux, and already described from Dr Smith's Optics. "First then, says he, the tool itself used by them in polishing the metal is formed with infinite difficulty. The first described polisher is directed to be made by covering the tool with farcenet, which is to be saturated with a solution of pitch in spirit of wine, by successive applications of it with a brush, till it is covered, and by the evaporation of the spirit of wine filled with this extract of pitch; the surface is then to be worked down and finished with

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the bruifer. This is all very easy in imagination; but whoever has used this method (which I have myself, unsuccessfully, several times) must have found it attended with infinite labour, and at last the business done in a very unsatisfactory manner; for the pitch by this process will be deprived of an essential part of its composition. The spirit of wine dissolves none but the resinous parts of its substance, which is hard and untractable; and if you use soap or spirit of wine to soften or dissolve it, it will equally affect the whole surface, the lower as well as the higher parts of it. And suppose that, with infinite labour with the bruifer, it is at last reduced to a fine uniform surface, it is nevertheless too hard ever to give a good polish with that lustre which is always seen in good metals. Nor will it give a good spherical figure: for a perfect sphere is formed, as I observed before, by that intimate accommodation arising from the wear and yielding of both tool and metal; whereas, in this method there is such a stubbornness in the polisher, that the figure of the metal, whether good or bad, must depend upon the truth of the former, which is very seldom perfect.

"If the polisher be made in the second manner proposed, viz. by straining the pitch through an outer covering, which is afterwards to be stripped off, the superficies of pitch and sarcenet is so very thin, that the putty working into them forms a surface hard and untractable, so that it is impossible to give the speculum a fine polish. Accordingly all those metals which are wrought in this way have an order of scratches instead of polish, discovering itself by a greyish visible surface. Besides, supposing this tool perfectly finished, and answering its purpose ever so well, it is impossible that it can produce in the speculum any other than a spherical figure; and indeed nothing else is expected from this method, as is evident from the experiment recommended to ascertain the truth of it. You are directed to place a small luminous object in the centre of the sphere of which the metal is a segment; and then having adjusted an eye-glass at the distance of its own focal length from the object, and so situated that the image of the object formed by the speculum may be visible to the eye, you are to judge of the perfect figure of the metal by the sharpness and distinctness with which the image appears. From hence it is very evident, that as the object and image are both distant from the metal by exactly its radius, nothing but a true spherical figure of the speculum can produce a sharp and distinct image; and that the image could not be distinct if the figure of the speculum were parabolic. Consequently, if the same speculum used in a telescope were to receive parallel rays, there would necessarily be a considerable aberration produced, and a consequent imperfection in the image. Accordingly, there never was a good telescope made in this manner; for if the number of degrees, or the portion of the sphere of which the great metal is a part, were as considerable as it ought to be, the instrument would bear but a very low charge, unless a great part of the circumference of the metal were cut off by an aperture, and the ill effects of the aberration by that means in some measure prevented.

"If ever a finished metal turned out without this defect, and has been found perfectly sharp and distinct, it must have been owing to an accidental parabolic

tendency, nowadays the natural result of the process, and therefore quite unexpected, and most probably unknown to the workman."

Our author next acquaints us, that, from observing the high polish of some of the metals made by Mr Short, and concluding that the high lustre of the polish could never have been produced in the manner above described, but by some more soft and tender substance, he was directed to make use of pitch itself, especially as Sir Isaac Newton mentions his having used that substance in his operations. Accordingly, shortening Dr Smith's process, he made a set of tools in the manner above-mentioned, except that he was obliged to make some subsequent alteration in the polisher. Having given a good spherical figure to the brass tool and the bruifer, and likewise to the metal upon the hones, and made the brass convex tool so hot as just not to hurt the finger, he tied a lump of common pitch, which should neither be too hard nor too soft, in a rag, and holding it in a pair of tongs over a still fire where there was no rising dust, till it was ready to strain through the linen, he caused it to drop on the several parts of the convex tool, till he supposed it would cover the whole surface to about twice the thickness of a shilling; then spreading the pitch as equally as he could, he suffered the polisher (the name he gives to the tool so prepared) to grow quite cold. He then made the bruifer so hot as almost to burn his fingers; and having fixed it to the bench with its face upwards, he suddenly placed the polisher upon it, and quickly slid it off; by this means rendering the surface of the pitch somewhat more equal. The pitch is then to be wiped off from the bruifer with a little tow; and by touching the surface with a tallow candle, and wiping it a second time, it will then be perfectly clean, and fit for a second process of the same sort, which must again be performed as quickly as possible; and this is ordinarily sufficient to give a general figure to the surface of the pitch. The bruifer and the polisher are then suffered to grow perfectly cold; when the pitch, considering what has been taken off, will be about the thickness of a shilling.

Here, however, it is necessary to observe, that the pitch should neither be very hard and resinous, nor too soft: if the former, it will be so untractable as not to work kindly; and if too soft, it will in working alter its figure faster than the metal, and too readily fit itself to the irregularity of its figure, if it have any. When both tools are perfectly cold, he gave the polisher a gentle warmth, and then fixed the bruifer to the block with its face upwards; and (having, with a large camel's-hair brush, spread over the face of the polisher a little water and soap to prevent sticking, with short, straight, and round strokes, he worked it upon the bruifer, every now and then adding a little more water and soap, till the pitch upon the polisher had a fine surface and the true form of the bruifer; and this he continued till they both grew perfectly cold together: in this manner the polisher was formed in about a quarter of an hour. But here a difficulty arose. For when he began to polish the metal, he found that the edge of the hole in the speculum collected the pitch towards the middle of the polisher: hence, though in this method of working

he could give an exquisite polish, as the putty lodged itself in the pitch exceedingly well, yet the figure of the metal was injured in the middle; nor indeed did the work go on with that equability which is the inseparable attendant on a good figure. In order to obviate this difficulty, he cast some metals with a continued face, the holes not going quite through, within perhaps the thickness of a sixpence. In this way he finished two or three metals, and the work went on very well; but when he came to open the holes, even though the utmost caution was used, the metals were found to be imperfect. This he attributed to an alteration of the figure from the removal of even that small portion of metal after the speculum had been finished. This he supposes to have been the cause of his spoiling a very distinct and perfect two-foot metal, which bore a charge of 200 times, only by opening the sharp part of the edge of the hole, because he thought that it bounded the field: so essentially necessary is an exquisite correctness of figure in the speculum of a perfect reflector.

This experiment not succeeding, instead of casting the metal without a hole, he made one quite through the middle of the polisher, a little less than that in the speculum. This perfectly answered the purpose; no more inconvenience arose from the gathering of the pitch, for it had now no greater tendency to collect at the centre than the sides; and thus he finished several metals successively, excellent both in figure and polish. One of these, of 2 inches diameter and 7.5 focal length, bore a charge of 60 times and upwards.

In this method of working, the polishing goes on in an agreeable, uniform, and smooth manner; and the small degree of yielding in the pitch, which is actually not more than the wearing of the metal, produces that mutual accommodation of surfaces so necessary to a true figure. In the beginning of the polish, and indeed for some time during the progress of it, (always remembering now and then to move the metal round its axis), he worked round and round, not far from, and always equally distant from, the centre; except that every time, previous to the shifting the metal on its axis, he used a cross stroke or two; and when the polish was nearly completed, he used mostly cross strokes, giving a round stroke or two likewise every time he turned the metal on its axis. In this method of working, he always observed that the metal polished fastest in the middle; inasmuch that one half or two thirds of it would be completely polished, when the circumference was scarcely touched by the tool. Observing this in some of the first metals, and not considering that this way of polishing was in fact a species of grinding, and as perfect as that upon the hones, he went on reluctantly with the work, almost despairing of being able to produce a good figure. However, he was always agreeably disappointed; for when the polish was extended to the edge, or within a tenth of an inch of it, he almost constantly found the figure good, and the performance of the metal very distinct. But this same circumstance of apparent defect in the metals, was in fact that to which their perfection was owing; for they all, contrary to his expectation, turned out parabolic. On the other hand, when he chanced to find that a metal, when first applied to the polisher, took the polish

equally all over, and consequently the business did not take up above 10 minutes; yet the metal constantly turned out good for nothing. From frequent observations, however, he at last found a method of giving a correct parabolic figure and an exquisite polish at the same time.

In polishing the speculum, in order to avoid the intrusion of any particles of emery, it would not be right to polish in the same room where the metal and tools were ground, nor in the same cloths which were worn in the former process; at least it would be necessary to keep the bench quite wet, to prevent any dust from rising.

Having then made the polisher, by coating the brass convex tool equally with pitch, which we suppose smoothed and deslivered with the brass tool in the manner before described, and which is a very easy process, the whole operation is begun and finished in the following manner.

The leaden weight, or handle, upon the back of the metal, should be divided into eight parts, by so many deep strokes of a graver upon the upper surface of the lead, marking each stroke with the numbers 1, 2, 3, 4, and so on, that the turns of the metal in the hand may be known to be uniform and regular.

To prevent any mischief from coarse particles of putty, it must be washed immediately before using. In order to this, put about half an ounce of putty into an ounce phial, and fill it two-thirds with water; then having shaken the whole, let the putty subside, and stop the bottle with a cork.

In a tea-cup with a little water, there should be a full-sized camel's-hair brush, and a piece of dry clean soap in a galley-pot: a soft piece of sponge will also be necessary. These, as well as the metal bruiser and polisher, should be constantly covered from dust.

The polisher being fixed down, and the camel's-hair brush being first wetted and rubbed a little over the soap, let every part of the tool be brushed over therewith; then work the bruiser with short, straight, and round strokes, lightly upon the tool, and continue to do so, now and then turning it, till the polisher have a good face, and be fit for the metal. Then having shaken up the putty in the phial, and touched the polisher in five or six places with the cork wetted with that and the water, place the bruiser upon the tool, and give a few strokes upon the putty to rub down any gritty particles; after which, having removed it, work the metal lightly upon the polisher round and round, carrying the edges of the speculum, however, not quite half an inch over the edge of the tool, and now and then with a cross stroke.

The first putty, and indeed all the succeeding applications of it, should be wrought with a considerable while: for if time be not given for the putty to bed itself in the pitch, and any quantity of it lie loose upon the polisher, it will accumulate into knobs, which will injure the figure of the metal; and therefore as often as ever such knobs arise, they must be carefully scraped off with the point of a penknife, and the loose stuff taken away with the brush. After the putty is well wrought into the pitch, some more may be added in the same manner, but never much at a time; and always remembering to work upon it first with the bruiser, for fear any gritty particles may find their way upon

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upon the polisher. If the bruiser be apt to stick, and do not slide smoothly upon the pitch, the surface of either tool may be occasionally brushed over with the soap and water, but it must be remembered that the wet brush must be but lightly rubbed upon the soap.

In the beginning of this process little effect is produced, and the metal does not seem to polish fast, in some measure owing to its taking the polish in the middle, and perhaps because neither that nor the bruiser move evenly upon the polisher: but a little perseverance will bring the whole into a good temper of working; and, when the pitch is well defended by the coating of the putty, the process will advance apace, and the former acquiring possibly some little warmth, the metal moves more agreeably over it, with an uniform and regular friction. All this while the metal must have no more pressure than that which it derives from its own weight and that of the handle; and the polisher must never be suffered to grow dry, but, as often as it has any tendency to do so, the edges of it must be moistened with the hair-pencil; and now and then, even when fresh putty is not laid on, the surface of the polisher should be touched with the brush to keep it moist.

When the polish of the metal nearly reaches the edge (for it always, as we said before, begins in the middle) you must alter your method of working; for now the round strokes must be gradually altered for the short and straight ones. Supposing then you are just beginning to alter them; after having put on fresh putty, and gently rubbed it with two or three strokes of the bruiser, you place the metal on the tool, and after a stroke or two round and round, give it a few forward and backward, and from side to side, but with the edges very little over the tool; then having turned the metal one-eighth round in your hand, and having moved yourself as much round the block (which must be remembered throughout the whole process) you go on again with a stroke or two round, to lead you only to the cross strokes, which are now to be principally used, and with more boldness. After this has been done some time, the metal will begin to move stiffly as the friction now increases, and the speculum polishes very beautifully and fast; and the whole surface of the polishing tool will be equally covered with a fine metallic bronze. The tool, even now, must not be suffered to become dry; a single round stroke in each of your stations and turnings of the metal will be sufficient, and the rest must all be cross ones, for we are completing a circular figure. You must now be very diligent; for the polisher drying, and the friction increasing very fast, the business of the spherical figure is nearly at an end. As the metal wears much, its surface must be now and then cleaned, with a piece of shammy leather, from the black stuff which collects upon it; and the polisher likewise from the same matter, with a soft piece of wet sponge. You will now be able to judge of the perfect spherical figure of the metal and tool, when there is a perfect correspondence between the surfaces, by the fine equable feel there is in working, which is totally free from all jerks and inequalities. Having proceeded thus far, you may put the last finishing to this figure of the metal by bold cross strokes, only three or four in the directions of each of the eight diameters, turning the metal at the same time: this

must be done quickly; for it ought, in this part of the process particularly, to be remembered, that, if you permit the tool to grow quite dry, you will never be able, with all your force, to separate that and the metal, without destroying the polisher by heat.

The metal has now a beautiful polish and a true spherical figure, but will by no means make a sharp distinct image in the telescope: for the speculum (if it be tried in the manner hereafter recommended) will not be found to make parallel rays converge without great aberration; indeed the deviation will be so great, as to be very sensibly perceived by a great indistinctness in the image.

In order then to give the speculum the last and finishing figure, which is done by a few strokes, it must be particularly remarked, that by working the metal round and round, the sphere of the polisher by this means growing less, it wears fastest in the middle; and as a segment of a sphere may become parabolic, by opening the extremes gradually from within outwards, so it may be equally well done by increasing the curvature in the middle, in a certain ratio, from without inwards.

Supposing then the metal to be now truly spherical, stop the hole in the polisher, by forcing a cork into it underneath, about an inch, so that it do not reach quite to the surface; and having washed off any mud that may be on the surface of the tool with a wet soft piece of sponge, whilst the surface of it is a little moist, place the centre of the metal upon the middle of the polisher; then having, with the wet brush, lodged as much water round the edge of the metal as the projecting edge will hold, fill the hole of the metal and its handle with water, to prevent the evaporation of the moisture, and the consequent adhesion between the speculum and polisher, and let the whole rest in this state two or three hours: this will produce an intimate contact between the two, and by parting with any degree of warmth they may have acquired by the vicinity of the operator, they will grow perfectly cold together.

By this time you may push out the cork from the polisher, to discharge the water, and give the metal the parabolic figure in the following manner.

Move the metal, gently and slowly at first, a very little round the centre of the polisher (indeed after this rest it will move stiffly); then increasing by degrees the diameter of these strokes, and turning the metal frequently round its axis, give it a larger circular motion, and this without any pressure but its own weight, and holding it loosely between the fingers: this manner of working may safely be continued about two minutes, moving yourself as usual round the block, and carrying the round strokes in their increased and largest state, not more than will move the edge of the metal half an inch or five-eighths over the tool. The speculum must not all this while be taken off from the polisher; and consequently no fresh putty can be added. It will not be safe to continue this motion longer than the time above-mentioned; for if the parabolic tendency be carried the least too far, it will be impossible to recover a true figure of that kind but by going through the whole process for the spherical one in the manner before described, by the cross strokes upon the polisher, which takes a great deal of time. However,

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when there is occasion, it may be done; and Mr Mudge has several times recovered the circular figure when he had inadvertently gone too far with the parabolic, and ultimately finished the metal on the polisher without the use of the hone.

It will now be proper to try the figure of the speculum; and that is always best done by placing it in the telescope it is intended for. In order to this, Mr Mudge uses the instrument as a kind of microscope; placing the object, however, at such a distance that the rays may be nearly parallel. At about 20 yards, a watch-paper, or some such object, on which there are some very fine hair-strokes of a graver, is fixed up. The lead must then be taken off from the back of the speculum; which is best done by placing the edge of a knife at the junction of the lead and metal, when, by striking the back of it with a slight blow, the pitch immediately separates, and the handle drops off; the remaining pitch may be scraped off with a knife, taking care that none of the dust stick to the polished face of the metal.

Having placed the speculum in the cell of the tube, and directed the instrument to the object, make an annular kind of diaphragm with card-paper, so as to cover a circular portion of the middle part of the metal between the hole and the circumference, equal in breadth to about one-eighth part of the diameter of the speculum: this paper ring should be fixed in the mouth of the telescope, and remain so during the whole experiment; for the part of the metal covered by it is supposed to be perfect, and therefore unemployed.

There must likewise be two other circular pieces of card-paper cut out, of such sizes, that one may cover the centre of the metal by completely filling the hole in the last described annular piece; and the other, such a round piece as shall exactly fit into the tube, and so broad as that the inner edge may just touch the outward circumference of the middle annular piece. It would be convenient to have these two last pieces so fixed to an axis that they may be put in their places, or removed from thence, so easily, as not to displace or shake the instrument. All these pieces therefore together will completely shut up the mouth of the telescope.

Let the round piece which covers the centre of the metal, or that which has no hole in it, be removed; and, by a nice adjustment of the screw, let the image (which is now formed by the centre of the mirror) be made as sharp and distinct as possible. This being done, every thing else remaining at rest, replace the central piece, and remove the outside annular one, by which means the circumference only of the speculum will be exposed, and the image now formed will be from the rays reflected from the outside of the metal. If there be no occasion to move the screw and the little metal, and the two images formed by these two portions of the metal be perfectly sharp and equally distinct, the speculum is perfect, and of the true parabolic curve; or at least the errors of the great and little speculum, if there be any, are corrected by each other.

If, on the contrary, under the last circumstance, the image from the outside of the metal should not be distinct, and it should become necessary, in order to make it so, that the little speculum be brought nearer, it is plain that the metal is not yet brought

to the parabolic figure; but if, on the other hand, in order to procure distinctness, you be obliged to move the little speculum farther off, then the figure of the great speculum has been carried beyond the parabolic, and hath assumed an hyperbolic form. When the latter is the case, the circular figure of the metal must be recovered (after having fixed on the handle with soft pitch) by bold eros strokes upon the polisher, finishing it again in the manner above described. If the speculum be not yet brought to the parabolic form, it must cautiously have a few more round strokes upon the polisher; indeed a very few of them in the manner before described make in effect a greater difference in the speculum than would be at first imagined. If a metal of a true spherical figure were to be tried in the above-mentioned manner in the telescope (which Mr Mudge has frequently done) the difference of the foci of the two segments of the metal would be so considerable, as to require two or three turns of the screw to adjust them; so very great is the aberration of a spherical figure of the speculum, and so improper to procure that sharpness and precision so necessary to a good reflecting telescope.

This is by no means the case with the object-glasses of refractors; for besides that they are in fact never so distinct as well-finished reflectors, the apertures of them are so exceedingly small, compared to the latter, and the number of degrees employed so very small, that the inconvenience of a spherical figure is not so much perceived. Accordingly we observe in the generality of reflectors, (whose specula, unless by accident, are always spherical), that the only true rays which form the distinct image arise from the middle of the metal: and unless the defect be remedied by a considerable aperture, which destroys much light, the false reflection from the inside of the metal produces a greyish kind of haziness, which is never seen in Mr Short's, or indeed in any good telescopes.

Supposing that the two foci of the different parts of the metal perfectly coincide; and that, by the union of them when the apertures are removed, the telescope shews the objects very sharp and distinct, you are not, however, even then to conclude that the instrument is not capable of farther improvement: for you will perceive a sensible difference in the sharpness of the image, under different positions of the great speculum with respect to the little one, by turning round the great metal in its cell, and opposing different parts of it to different parts of the little metal, correcting by this means the error of one by the other. This attempt should be persevered in for some time, turning round the great speculum about one-sixteenth at a time, and carefully observing the most distinct situation each time the eyepiece is screwed on: when, by trying and turning the great metal all round, the distinctest position is discovered, the upper part of the metal should be marked with a black stroke, in order that it may always be lodged in the cell in the same position. This is the method Mr Short always used; and the caution is of so much consequence, that he thought it necessary to mention it very particularly in his printed directions for the use of the instrument.

And, farther, Mr Short frequently corrected the errors of the great by the little metal in another way. If the great speculum did not answer quite well in the

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telescope, he cured that defect sometimes by trying the effect of several metals successively, by this means correcting the errors of one by the other; for in several of his telescopes which have passed thro' our author's hands, when the sizes and powers have been the same, he has found that the great metals, tho' very distinct in their proper telescopes, yet have, when taken out and changed from one to the other, spoiled both telescopes, rendering them exceedingly indistinct, which could arise from no other circumstance. For this reason he supposes it was, that Mr Short kept, ready furnished, a great many large metals of the same focal length, so that, when he wanted to mount a telescope, he might from a great choice be able to combine those metals which suited each other best. Our author is strongly inclined to believe this was the case, not only from the above observation, but because he shewed him a box of finished metals, in which he is sure there were a dozen and a half of the same focal length.

To return: A little use in working will make the whole of the process of grinding and polishing very easy and certain; for though we have endeavoured to be as particular as possible, it is yet scarcely possible to supply a want of dexterity, arising from habit only, by the most laboured and minute description. And though the above account may appear irksome to the reader, as it lies cold before the eye, it is hoped, whoever attempts to make the instrument, will not complain of it as tediously particular.

It may, however, be farther remarked, that when the metal begins to move stiffly upon the polisher, and particularly when the figure is almost brought to the parabolic form, it will be necessary to fix the elbows against the sides, in order to give momentum and equality to the motion of the hand by that of the whole body.

The same polisher will serve for several metals, if it be somewhat warmed when you begin to use it.

There is another circumstance, and a material one too, which must not be omitted; it is this. For the very same reason that the pitch should not be too hard or soft, the work will not proceed well in the heat of summer, or the cold of winter: in the latter, it may be possible to remedy the defect by having the room warmed with a stove; and in the summer, the other inconvenience may perhaps be avoided by using a harder kind of pitch; but our author much doubts in either case whether the work will go on so kindly: he has himself always wrought in spring and autumn.

The process of polishing, and indeed grinding upon the hones, will not go on so well if it be not continued uninterruptedly from beginning to end: for if the work of either kind be left but for a quarter of an hour, and you then return to it again, it will be some time before the tool and metal can get into a kindly way of working; and till they do, you are hurting what was done before.

We have all along supposed that the metal we have been working was about four inches diameter: if it be either larger or smaller, the sizes of the hones, bruiser, and polisher, must be proportionably different. Our author says he never found any ill-consequence arising from the different expansion from heat and cold in any of the tools, though they be made of different metals and substances, unless the inconvenience, occa-

sioned by the interruption before hinted at, be thought to result from thence; for the alteration produced in the surface of the speculum, both by grinding and polishing, is so much quicker than any that can be supposed to arise from the former cause, that it is never attended with any practical consequence.

Magnifying very minute objects, and particularly reading at a distance, have been generally considered as the surest test of the goodness of a telescope; and indeed, when the place is placed at a great distance, so that the letters subtend but a very small angle at the eye, if then they appear with great precision and sharpness, it is most probable that the instrument is a good one. But we are, nevertheless, sometimes apt to be deceived by this method; nor is it always possible to determine upon the different merits of two instruments of equal power, by this mode of examination; for when the letters are removed to the utmost extent of the powers of the two instruments, the eye is apt to be prejudiced by the imagination. If two or three words can be here and there made out, all the rest are guessed at by the sense; inasmuch that an observer, zealous for the honour of his instrument, is very apt to deceive himself in spite of his intentions. The surer test is by figures, where you can procure no aid from this sort of deception. In order to examine reflecting telescopes, our author made upon a piece of copper, and on a black ground, six lines consisting of about 12 pieces of gold figures, and each line of figures differing in magnitude; from the smallest that could be distinctly made, to those of about two-tenths of an inch long: moreover, the figures in the several lines were differently disposed, and the sum of each line also differed. It is evident that by this method all guesses is precluded; and that of two instruments, of the same powers, that which can make out the least order of figures, which will be known by the sum, is the best telescope. Such a plate he caused to be fixed up for experiments against the top of a steeple, about 300 yards north of his house; and it will serve to give some idea of the distinctness with which very small figures could be made out at that distance, by saying, that in a clear state of the air, and with the sun behind him, with a telescope of 18 inches focal length, which count Bruhl did him the honour to accept, and now has in his possession, he has seen the legs of a small fly, and the shadows of them, with great precision and exactness.

"I cannot conclude, (says our author,) without indulging myself in an observation on the amazing sagacity of Sir Isaac Newton in every subject upon which he thought fit to employ his attention. It was he who first proposed, and indeed practised, the polishing with pitch: a substance, which at first sight, perhaps, every one but himself would have thought very improper, from its softness, to produce that correctness of figure so necessary upon these occasions; and yet I do believe, that it is the only substance in nature that is perfectly calculated for the purpose: for at the same time that it is soft enough to suffer the putty to lodge very freely on its surface, and for that reason to give a most tender and delicate polish; it is likewise totally inelastic, and therefore never, from that principle, suffers any alteration in the figure you give it. If the first makers of the instrument, therefore, had given proper credit to, or had simply followed the hint

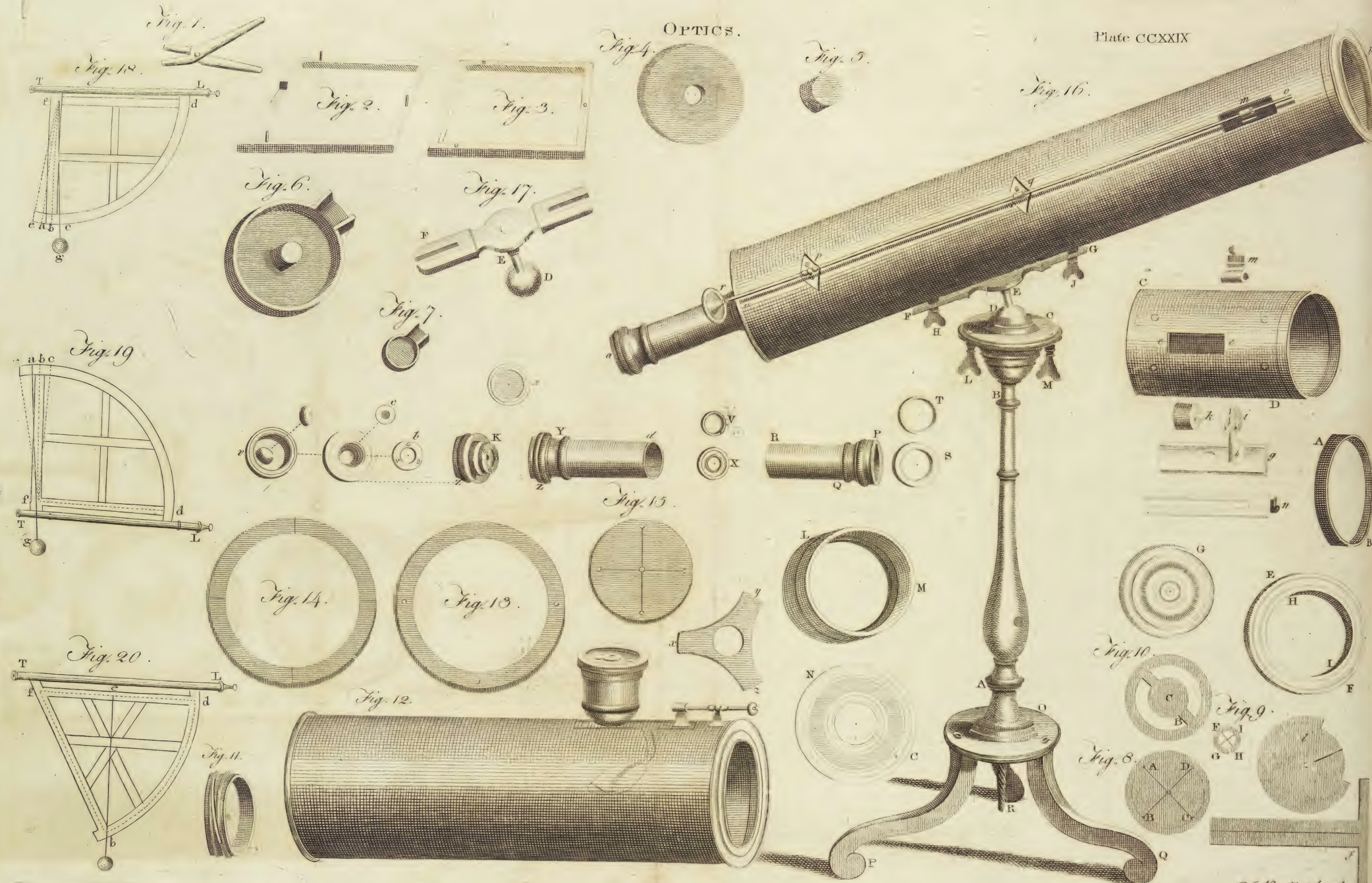
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Fig. 7.

Fig. 10.



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Mechanism of Optical Instruments. hint Sir Isaac gave, it would have saved them infinite trouble, and they would have produced much better instruments; but the pretended refinement, of drawing a tincture from pitch with spirits of wine, affords you only the refinous, hard, and untractable part of the pitch, divested of all that part of its original substance, which is necessary to give it that accommodating pliability in which its excellence consists." It is needless to swell this account with a detail of the process for polishing the little speculum, as it must be conducted in the same manner which has been already described in that of the large one: only observing, that as the little metal has an uninterrupted face, without a hole, so there is no occasion for one in the polisher; and likewise that, as a spherical figure is all that need here be practically attempted, so the difficulty in finishing is infinitely short of that of the other.

Method of folding a piece of brass to the small mirror. As it is always necessary to solder to the back of the little speculum a piece of brass, as a fixture for the screw to adjust its axis, Mr Mudge mentions a safe and neat method of doing it, which may be very useful to the optical or mathematical instrument-maker upon other occasions. Having cleaned the parts to be soldered very well, cut out a piece of tin-foil the exact size of them; then dip a feather into a pretty strong solution of *sal ammoniac* in water, and rub it over the surfaces to be soldered; after which place the tin-foil between them as fast as you can (for the air will quickly corrode their surfaces so as to prevent the solder taking), and give the whole a gradual and sufficient heat to melt the tin. If the joints to be soldered have been made very flat, they will not be thicker than a hair: though the surfaces be ever so extensive, the soldering may be conducted in the same manner; only care must be taken, by general pressure, to keep them close together. In this manner, for instance, a silver graduated plate may be soldered on to the brass limb of a quadrant, so as not to be discernible by any thing but the different colour of the metals. This method was communicated to our author by the late Mr Jackson, who during his life kept it a secret, as he used it in the construction of his quadrants.

In Plate CCXXVIII. are figured the shape of the leaden tool for rough-grinding; the hones; and the apparatus to be applied in the mouth of the telescope, to ascertain the true figure of the speculum.

Fig. 7. The grinder for working off the rough face of the metal: the black strokes represent deep grooves made with a graver.

Fig. 8. The bed of hones, which is to complete the spherical figure of the speculum, and to render its surface fit for the polisher.

Fig. 9. An apparatus for examining the parabolic figure of the speculum.

AA, The mouth of the telescope, or edge of the great tube.

BB, A thin piece of wood fastened into and flush with the end of the tube; to which is permanently fixed the annular piece of pasteboard CC, intended to cover and to prevent the action of the corresponding part of the speculum.

D, Another piece of pasteboard, fixed by a pin to the piece of wood BB, on which it turns as on a centre; so that the great annular opening HH,

may be shut up by the ring FF, or the aperture GG by the imperforate piece E, in such manner, that in the first instance the reflection may be from the centre, and in the latter from the circumference, of the great speculum.

§ 6. Description of the different parts of which Reflecting Telescopes are composed, and of fitting up an instrument of that kind; with the rectification of Telescopic sights of Quadrants, &c.

In Plate CCXXIX. all these are distinctly represented.

Fig. 1. shews the form of a pair of pincers necessary on several occasions, particularly for breaking off the corners of a piece of glass, in order to make the eye-glasses.

Fig. 2. 3. Two wooden frames for confining the sand in which the metalline specula are to be cast.

Fig. 6. 7. Two iron moulds in which are to be cast two models of lead for the specula. These models are afterwards to be turned as exactly as possible to the gauges, and then used for giving the form necessary to the sand in the frames.

Having cast the specula, and polished them according to the directions already given, you must next provide a tube of plate brass, well smoothed, for the body of your telescope; and whose length must be determined by the focal length of the large speculum. This tube must be painted black on the inside, in order to reflect as little extraneous light as possible. When the telescopes are small, brass is the usual material of the tube; but when large, the expence will be lessened by making them of wood. This tube must have a slit in one of its sides, for allowing the small mirror to slide up and down.

AB is a circle of brass, to be soldered round the mouth of the tube CD, in order to keep on the cover. Of this cover EFHI shews one piece, which is another brazen circle fitting the one AB so closely that it cannot be taken off or put on without some difficulty. G is a solid plate, which being fitted to the middle vacancy of the former, completes the cover.

LM is another circle of the same materials which contains the large speculum, and to which is soldered the piece NO, having a hole in it to receive the eye-piece of the telescope. *xyz*, Is a thin piece of copper, a little bent, on which the speculum is laid, and which by its spring keeps it stiff in its place.

The eye-piece may be composed of two tubes RPQ and Y dZ, of which the latter slides upon the former. KZ is the extremity of the eye-piece; and hath a small hemisphere perforated, in order to admit the light to the eye. The various parts of this extremity are represented at *b*, *c*, and *v*, which will give a more perfect idea of it than any description. In this eye-piece are placed the two lenses which magnify the image from the mirrors, and which are kept in their proper places by the rings S, T, V, X.

The small mirror is now to be fixed exactly in the middle of the tube, which is best done by such a contrivance as is shewn at *gbi*, *k* and *n*. *f* is a ruler of brass, which, sliding along with the piece *g*, preserves, by means of its cross branches, the small mirror from falling from side to side as the telescope happens to be turned. *l* is a round piece of brass, fastened on the

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immovable piece *i*, and which holds the small speculum. By means of a dove-tail fit it can be moved up and down till we find the position of the speculum is right, after which it is to be firmly screwed on to the piece *i*. *m* is a small piece of brass, having a female screw, in which the rod *ro* is screwed, and which moves the little speculum up or down, as it shall be found necessary for procuring distinct vision.

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Method of
adjusting
the large
mirror.Plate
CCXXIX.

Having now got all the parts of your telescope, it is necessary in the first place to see that the tubes are perfectly straight and round; after which you may proceed to place your mirrors in the telescope, and to prove their situation by the following method.—AB CD, fig. 8. is a circle drawn on a round piece of pasteboard, having a small hole in the centre at E. FGHI (fig. 9.) is another perforated circular piece of pasteboard, having two hairs crossing each other as in the figure. The former of these is placed just behind the large mirror; the latter in the place where the nearest eye-glass should stand. If the light passing through the small hole in the large circle falls exactly on the intersection of the hairs, it shews that the large speculum is properly placed; if not, its situation must be altered till this is accomplished.

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Of adjust-
ing the
small spec-
ulum,

AB (fig. 10.) shews the shape of another piece of pasteboard, likewise perforated in the centre at C. The small circle is to be of the diameter of the lesser speculum; and when the pasteboard is put exactly in its focus, the light will pass straight through the little hole and eye-piece, so as to be distinctly visible if the position of the speculum is exactly right; but if that is not the case, the light will fall either to one side or other, and the position of the speculum must be altered accordingly.

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Of adjust-
ing the
mirrors of
a Newton-
ian tele-
scope.

Fig. 12. Shews a telescope of the Newtonian form, in which the plane speculum is somewhat nearer the large one than in those formerly described: in consequence of which this requires a small eye-piece at the side, that the magnifying glass may be placed at a sufficient distance from it. This telescope is to be adjusted in the following manner. Let there be provided two circles of pasteboard, represented fig. 13. and 14. both of which are perforated in such a manner, that the tube of the telescope may just enter the perforation. The circle fig. 13. is divided into quadrants, at each of which is pricked a hole with a pin. That represented fig. 14. is also divided into quadrants; but, instead of pin-holes, has black lines drawn upon it. The former is to be fixed on the open end of the tube, and the latter on the end where the concave speculum is placed. The telescope is then to be turned towards the sun, so that the little specks of light passing thro' the pin-holes of the circle fig. 13. fall upon the black circular lines of fig. 14. Have then ready another piece of pasteboard, fig. 15. perforated with pin-holes in five different places as there represented. This piece must exactly fit the opening of the telescope; and while the tube continues thus turned straight to the sun, look through the eye-piece. If all the specks of light coming through the holes in the pasteboard are seen distinct in the plane mirror, it is a sign that the mirrors are in a proper position with regard to each other: but if not, some of them will not be seen at all, or will appear confused and indistinct; in which case, the situation of the mirrors must be altered till the light ap-

pears bright and distinct.

In the application of telescopes to astronomical instruments and many other purposes, it is absolutely necessary to fix the plane of the cross-hairs exactly upon the plane of the picture of an object; which may easily be done from a knowledge of the following properties. First, let the interval between the two convex glasses of the telescope be adjusted to shew an object distinctly; and if the hairs appear confused, they will seem to dance upon the object, while the eye moves sideways; and in dancing, if they seem to move the same way as the eye does, they lie behind the picture of the object; but if they move the contrary way, they lie before it; and must be removed accordingly, till they appear distinct; and then they will also seem fixed upon the object, notwithstanding the motion of the eye. Secondly, let the interval between the hairs and the eye-glass be first adjusted, till the hairs appear distinct; then, if the object appears confused, it will also appear to dance while the eye moves sideways; and in dancing, if it moves the same way as the eye does, its picture is behind the hairs; if the contrary way, its picture is before them; and to bring it to the hairs, either the object-glass must be moved, or else the hairs and eye-glass both together. In both these cases, it is the confused object (for the hairs may also be called so) that seems to move, and the distinct one to stand still; as in vision with the naked eye. For, to a person in motion, suppose he be walking, any object appears fixed that he fixes his eyes upon and sees distinctly, while the rest that are nearer or farther off appear confused and in motion; the reason of it is too obvious to need an explanation. But to shew it in the telescope, let *h* be the intersection of the cross-hairs, and *h'k* a pencil of rays flow-
ing from it, which, after refraction through the eye-
glasses *eai*, belong to the focus *k*, either at a finite or an infinite distance. Draw *he*, the axis of this pencil, cutting the object in *Q*, and its picture in *q*; and let the emergent rays of the pencil *qab*, flowing from *q*, cut the emergent rays of the former pencil in the points *p*, and belong to the focus *b*, either at a finite or an infinite distance. Now, if the eye be placed at any point *o* in the common axis of these pencils, the points *h*, *Q*, will both appear in the same direction *oe*; but if the eye be moved sideways from *o* to *p*, the point *Q* will appear in the direction *pa*, and the point *h* in the direction *pi*. And from hence the reason of the foregoing cases will be sufficiently manifest, by attending to the figures. Lastly, while the foci *h*, *q* are disjoined, the mutual inclination of the emergent rays in one pencil, must be different from the mutual inclination of the emergent rays in the other; and so the humours of the eye cannot be adapted to collect the rays in both pencils to two distinct points. If one be distinct, the other will be confused, and in a different part of the retina; (except when the eye is in the axis:) but when the foci *h*, *q*, are united, the foci *k*, *b*, of the emergent rays will also be united; and consequently the coinciding rays of both pencils will be united in the same point of the retina, wherever the pupil of the eye be placed; and therefore the corresponding points of the object and cross-hairs will appear fixed together without any parallax.

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Of fixing
cross-hairs
in the focal
of tele-
scopes.Plate
CCXXV.
fig. 1. to 4.

When.

Mechanism of Optical Instruments. When the place of the hairs is thus determined, it may be of use to measure their distance from the object-glass; which is the exactest way of finding its focal distance, if the object be very remote. And to keep this distance always the same whenever the telescope is used, it is convenient to have marks or stops at the end of each joint of the tube. For then, whatever eye-glass be applied, the object and hairs will both appear distinct at the same time, and without parallax. Instead of hairs, the finest silver wires are now made use of, but are still called *hairs*.

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Line of collimation defined. A line drawn from the intersection of the hairs through the centre of refractions in the object-glass, whether it coincides with the axis of the glass or is inclined to it, is called the *line of collimation* or *line of sight*; because this line produced, falls upon the object in that point whose image falls upon the intersection of the hairs: and therefore the straight ray that describes this line, answers to the visual ray by which we take aim at an object with plain-sights. Hence, when the object-glass and hairs are firmly fixed in a strong tube, or to a straight ruler, it is manifest, that the line of sight is as immutable with respect to the tube, as if two little holes or plain-sights were substituted in the places of the intersection of the hairs, and of the centre of refractions in the object-glass.

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How to adjust telescope sights. In order to set the line of sight parallel to a given line upon the plane of an instrument, the object-glass must be firmly fixed, and the ring or plate that carries the cross-hairs must have two gradual motions in its own plane by two screws at right angles to each other; for by this means the intersection of the hairs may be moved to any given point in that plane. These motions are effected by three brass plates laid over one another. The uppermost, having a circular hole in it, over which the hairs are strained, slides over the middlemost in the direction of an oblong hole cut in it, whose breadth is somewhat greater than that of the hole above it; and these two together slide sideways over the undermost plate, in which there is a larger oval hole. We shall describe these plates more particularly in a contrary order. On each side of the oval hole in the middle of the plate R last mentioned, two brass ledges *m, n*, are firmly riveted to receive the dove-tailed sides of the plate S; and the contiguous ends of both these plates are turned up square at *b* and *e*; and through a hole *b*, in the middle of the part turned up in the larger plate R, there works a pretty thick screw *abc*, whose fore-end *c* being filed to a neck, goes through a hole *e* in the lip of the other plate S; and in the end of the neck *c* there is made a small screw hole to receive a screw-pin *d*; so that by turning the screw *abc* with a kind of a watch-key, the plate S is moved backwards or forwards between the ledges *m, n*. The figure T represents two more ledges *o, p*, that are to be riveted upon the plate S; these ledges are part of the plate T turned up at right angles to them, in which part there is the like contrivance of a screw *abcd* to move a third plate V between the ledges *o, p*, at right angles to the former motion. The silver wires are strained over the hole in the plate V by four small pegs, that fix them in four little holes. The other end of the plate R, opposite to the part *b* that carries the screw, is bent square the

contrary way to the part *b*; or, which answers the same purpose, one ledge *ef* of the plate X bent square, is riveted to the backside of the plate R at the end opposite to the screw *b*; and its other ledge *gh* is screwed to the side of the tube of the telescope; and the necks of the screws go through long slits in this ledge, to give liberty of placing it accurately at the due distance from the object-glass: and for the purpose of letting this brass work into the tube, two large slits must be cut in two contiguous sides of it: one of which may best be covered with a thin piece of horn, to admit the light of a candle upon the hairs in observing small stars in the night time.

To make the line of sight through a moveable telescope parallel to a given line YZ upon a fixed plane; Fig. 5 let the ends of the tube of the telescope, whether square or cylindrical, be put through two holes in two square plates *abcd*, and *efgh*, made exactly equal to each other, and so fixed to the tube that the sides of the one may be exactly parallel to the sides of the other; which is easily done by applying their corners *a, e*, to the given line YZ, and by drawing two lines *a i, e k*, perpendicular to it, upon the given plane, and by making all the corresponding sides, as *a b, e f*, coincide with these perpendiculars. Then observe what point of a remote object is covered by the intersection of the hairs when the corners *a, e*, touch the given line YZ, and likewise what other point is covered by them when the opposite corners *c, g*, touch the same line in the same places, that is, when the telescope is turned upside down or half round. Then conceiving these two points of the object to be connected by a straight line, move the cross-hairs by the two screws, till you judge their intersection bisects that line; and by repeating the same practice, you may soon bring the intersection of the hairs to cover one and the same point of the object, when the opposite corners of the squares are successively applied to the line YZ; and then the line of sight will be parallel to it.

To shew the reason of this practice, we may suppose the centre of refraction in the object-glass to be any point *l* of the square *abcd*, and the intersection of the hairs to be any point *m* of the square *efgh*. Upon the plane of the first square, and through its centre *o*, draw *loa*, and take *oa* equal to *ol*; also upon the plane of the second square, and through its centre *p*, draw *mpa*, and take *pa* equal to *pm*. Join *lm* and *ap*; and supposing *lm* and *ap* parallel to the axis *o p*, join *mn, n p, p l*. Then because the respective sides about the equal angles *m p n, n p l*, are made equal, the lines *m n, n p*, opposite to them, are also equal and parallel. Now the parallel lines *n l, p o, n p*, produced will fall upon a remote object in three points so close together as to appear like a single point thro' the telescope; and consequently the planes of the parallel triangles *lmn, n p l*, produced, will cut the same object in two parallel lines so close together as to appear but one line through the telescope; and since the angles *m l n, n p l*, are equal, the intersection of the hairs, now at *m* and then turned half round to *p*, will cover two points in that line equidistant from the point abovementioned, and on opposite sides of it: therefore, by removing the intersection from *m* to *n*, it will appear to bisect the interval between those two points; and then the line of sight *n l* will be parallel

to the axis fo , and to the sides of the parallelopiped, and also to the given line YZ .

A telescope thus prepared, may be useful upon several occasions; as if it be required to rectify the hairs in a telescope fixed to any instrument, so as to set the line of sight parallel to a given line upon the plane of the instrument. Apply the corners of the squares of the telescope abovementioned to the given line, and observing what point of a remote object is covered by its cross hairs, move the cross hairs of the fixed telescope till they cover the same point of the object, and the business is done.

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Of rectifying the sights of quadrants and sextants here transcribed by a plumb-line.

Plate
CCXXIX.
fig. 18, 19.

But the telescopic sights of quadrants and sextants, whose planes may be readily placed in any given posture, may be rectified by a plumb-line. We shall here transcribe an account of these rectifications from Mr Molyneux's *Dioptrics*, p. 238. "I come now to the rectification of these sights on quadrants and sextants, for taking angles. This may be done either before or after the division into degrees, &c. are made on the limb of the quadrant. If it be done before, then we suppose the telescope TL fixed to the quadrant, which we suppose continued a little farther than the fourth part of a circle. Choosing then an object pretty near the horizon; let us look thro' the telescope, in the usual posture of observation, and observe the point in the object marked by the cross-hairs; and at the same time we are to note most nicely the point c , which the plumb-line fsg , hung from the centre f of the quadrant, cuts on the limb. Then we are to invert the quadrant into the posture of fig. 19. (which is easily done by the usual contrivances for managing great quadrants, by toothed semicircles and endless screws) keeping still the telescope TL nearly upon the same height from the ground as before, unless the object we look at be so far distant, that the breadth of the quadrant subtends but an insensible angle. But yet for certainty, it is better to keep the telescope, as it is said, upon the same height from the floor; then direct the telescope TL , that the cross hairs may cover exactly the same point in the object, as before in the posture of fig. 18. And hanging now the plumb-line afg on the limb of the quadrant, let us remove it to and fro, till we find out the exact point a , from which the plumb-line being hung, shall most nicely hang over the centre of the quadrant f . Then carefully marking the point a , let us divide the arch ca into two equal parts in b ; and drawing bf , the point b is the point from which we are to begin the divisions of the quadrant: and the line of collimation through the telescopic sight, stands exactly at right angles to the line bf . So that the quadrant bf being complicated and divided, the said line of sight thro' the telescope runs exquisitely parallel to the line fd .

"In the next place, supposing the quadrant bf duly complicated and divided; and that we designed to fix thereto the telescopic sight TL , so that the line of sight may run exactly at right angles to the line bf , or parallel to the line df ; we are to do as in the foregoing praxis. And if, in dividing the arch ac , we find its half exactly coincident with the point b , we have our desire. But if it differs from the point b , and falls between b and d , then the line of collimation through the telescope stands at an obtuse angle with

the line bf ; and the instrument errs in excess: if this half arch fall without b and d , then the line of collimation makes an acute angle with the line bf ; and the instrument errs in defect. And by often trials, we are to remove the cross-hairs within the tube, so much as is requisite to correct this error. And when we have thus rectified them to their due place, there they are to be strongly fixed. Or else, in observations taken by this instrument, we are to make allowance for this error; by subtracting from (if it be in excess), or by adding to (if it be in defect), each observation, so much as we find the error to be.

"The reason of this rectification is most plain; for it is manifest, that efd wants of a full quadrant, as much as afd exceeds a quadrant. So the difference of the two arches in the two postures being ac ; half this difference bc added in fig. 18. or ab subtracted in fig. 19. makes b a complete quadrant.

"If we find our instrument errs in taking angles, and we desire to know the error more nicely than perhaps the divisions of the instrument itself will shew it, we are to do thus. Supposing the quadrant bf already accurately divided, and that the plumb-line plays over the point c ; and upon the inversion of the instrument, we find that before we can get it to play exactly over the centre f , we must hang it over the point e , so that the arch eb exceeds bc by the arch ea ; it is plain that the angle efa is the error of the instrument: for had the plumb-line hung over a , and over the centre f , in this latter posture, the instrument had been exact; because a is as much on one side b , as c is on the other side b . Wherefore efa being the angle by which our instrument errs in observation, let us turn the instrument into the usual posture of observation, as in fig. 18. and hanging the plumb-line on the centre f , let us bring it to play nicely on the point e , and observe what distant object is covered by the cross-hairs: then let us bring it to play exactly on the point a , and observe likewise what distant object is pointed at by the telescope-hairs. Lastly, by a large telescope and micrometer, let us measure the angle between these two objects, and we shall have the angle of error much more nicely than it is possible the angle efa should be given by the divisions on the limb of the quadrant ea . And thus much for adjusting a quadrant.

"A sextant is rectified in like manner; if we consider, that if from the centre f to the beginning of the divisions d there be drawn the radius fd , and it be divided equally in c , and from c there be suspended the plumb-line cb : when the plumb-line hangs over the 60th degree at b , then the line fd lies horizontal; and consequently, if the line of collimation thro' the tube be parallel to fd , this line also lies horizontal. To try which, whilst the sextant stands in this posture, observe the object marked by the cross-hairs; then invert the sextant, and over the point b hang the plumb-line; and when from the point b the plumb-line hangs over the middle point c , then again is the line fd horizontal in this posture. Mark, then, whether the cross-hairs cover the same object as before: if they do, then the line of collimation is parallel to fd ; if they do not, but the point in the object marked in this latter posture be higher than the point marked in the first posture, the instrument errs in excess; if it be lower, the instrument

instrument errs in defect. And either we are to remove the cross-hairs, till we bring all to rights, and there fix them; or by the methods before laid down in the rectification of the quadrant, we are to find the quantity of this erroneous angle, and to allow for it in observation.

"In instruments furnished with two pair of telescopic sights, one on a fixed arm, and the other on a moveable arm (by the ancients termed an *alidade*); it is easy rectifying the sights on the moveable arm, thus. After the sights on the fixed arm are rectified by what foregoes, bring the index of the moveable arm, to the beginning of the divisions on the limb of the instrument, be it quadrant or sextant, &c. it is then manifest, that the line of collimation through the moveable telescope (if it be right) should lie parallel to the line of collimation through the fixed telescope. Observe, therefore, whether the cross-hairs in both telescopes do at the same time cut the same star, or fall on the same point in an object distant three or four miles. If they do, then the moveable telescope agreeing with the fixed, and the fixed being supposed rectified to the divisions on the instrument, the moveable is right likewise. But if the hairs in the moveable telescope do not agree in marking the same point with the cross-hairs in the fixed telescope, then the hairs in this moveable telescope are to be removed (by whatever contrivance there is for that purpose) and brought to rights, and there fixed."

There are other methods propounded for rectifying telescopic sights on other sorts of instruments, by means of observations towards the zenith, as our former methods have been employed towards the horizon. But it is sufficient here to lay down only what foregoes, as being of the greatest and most frequent use: referring for the others to M. Picard's "Treatise of the measure of a degree of a great circle of the earth," published at the end of the "Memoirs of a Natural History of animals, &c." by the Royal Academy at Paris; translated into English and printed at London 1688, folio.

SECT. VII. *Of the different Merits of Microscopes and Telescopes, compared with one another: how far we may reasonably depend on the Discoveries made by them, and what hopes we may entertain of further Improvements.*

THE advantages arising from the use of microscopes and telescopes depend in the first place upon their property of magnifying the minute parts of objects, so that they can by that means be more distinctly viewed by the eye; and, secondly, upon their throwing more light into the pupil of the eye than what is done without them. The advantages arising from the magnifying power would be extremely limited, if they were not also accompanied by the latter: for if the same quantity of light is spread over a large portion of surface, it becomes proportionably diminished in force; and therefore the objects, though magnified, appear proportionably dim. Thus, though any magnifying glass should enlarge the diameter of the object 10 times, and consequently magnify the surface 100 times, yet if the focal distance of the glass was about eight inches, (provided this was possible), and its diameter only about the size of the pupil of the eye, the object would appear 100

times more dim when we looked thro' the glass, than when we beheld it with our naked eyes; and this, even on a supposition that the glass transmitted all the light which fell upon it, which no glass can do. But if the focal distance of the glass was only four inches, tho' its diameter remained as before, the inconvenience would be vastly diminished, because the glass could then be placed twice as near the object as before, and consequently would receive four times as many rays as in the former case, and therefore we would see it much brighter than before. Going on thus, still diminishing the focal distance of the glass, and keeping its diameter as large as possible, we will perceive the object more and more magnified, and at the same time very distinct and bright. It is evident, however, that with regard to optical instruments of the microscopic kind, we must sooner or later arrive at a limit which cannot be passed. This limit is formed by the following particulars. 1. The quantity of light lost in passing through the glass. 2. The diminution of the glass itself, by which it receives only a small quantity of rays. 3. The extreme shortness of the focal distance of great magnifiers, whereby the free access of the light to the object which we wish to view is impeded, and consequently the reflection of the light from it is weakened. 4. The aberrations of the rays, occasioned by their different refrangibility.

To understand this more fully, as well as to see how far these obstacles can be removed, let us suppose the lens made of such a dull kind of glass that it transmits only one half of the light which falls upon it. It is evident that such a glass, of four inches focal distance, and which magnifies the diameter of an object twice, still supposing its own breadth equal to that of the pupil of the eye, will shew it four times magnified in surface, but only half as bright as if it was seen by the naked eye at the usual distance; for the light which falls upon the eye from the object at eight inches distance, and likewise the surface of the object in its natural size, being both represented by 1, the surface of the magnified object will be 4, and the light which makes that magnified object visible only 2; because though the glass receives four times as much light as the naked eye does at the usual distance of distinct vision, yet one half is lost in passing through the glass. The inconvenience in this respect can therefore be removed only as far as it is possible to increase the clearness of the glass, so that it shall transmit nearly all the rays which fall upon it; and how far this can be done, hath not yet been ascertained.

The second obstacle to the perfection of microscopic glasses is the small size of great magnifiers, by which, notwithstanding their near approach to the object, they receive a smaller quantity of rays than might be expected. Thus, suppose a glass of only $\frac{1}{100}$ th of an inch focal distance; such a glass would increase the visible diameter 80 times, and the surface 6400 times. If the breadth of the glass could at the same time be preserved as great as that of the pupil of the eye, which we shall suppose $\frac{1}{100}$ th of an inch, the object would appear magnified 6400 times, at the same time that every part of it would be as bright as it appears to the naked eye. But if we suppose that this magnifying glass is only $\frac{1}{2}$ th of an inch in diameter, it will then only receive $\frac{1}{4}$ th of the light which

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otherwise would have fallen upon it; and therefore, instead of communicating to the magnified object a quantity of illumination equal to 6400, it would communicate only one equal to 1600, and the magnified object would appear four times as dim as it does to the naked eye. This inconvenience however is still capable of being removed, not indeed by increasing the diameter of the lens, because this must be in proportion to its focal distance, but by throwing a greater quantity of light on the object. Thus, in the above-mentioned example, if four times the quantity of light which naturally falls upon it could be thrown upon the object, it is plain that the reflection from it would be four times as great as in the natural way; and consequently the magnified image, at the same time that it was as many times magnified as before, would be as bright as when seen by the naked eye. In transparent objects this can be done very effectually by a concave speculum, as in the reflecting microscope already described: but in opaque objects the case is somewhat more doubtful; neither do the contrivances for viewing these objects seem entirely to make up for the deficiencies of the light from the smallness of the lens and shortness of the focus. When a microscopic lens magnifies the diameter of an object 40 times, it hath then the utmost possible magnifying power, without diminishing the natural brightness of the object.

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Utmost
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power of a
microscope,
without di-
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the light.

The third obstacle arises from the shortness of the focal distance in large magnifiers: but in transparent objects, where a sufficient quantity of light is thrown on the object from below, the inconvenience arises at last from straining the eye, which must be placed nearer the glass than it can well bear; and this entirely supercedes the use of magnifiers beyond a certain degree.

The fourth obstacle arises from the different refrangibility of the rays of light, and which frequently causes such a deviation from truth in the appearances of things, that many people have imagined themselves to have made surprising discoveries, and have even published them to the world; when in fact they have been only as many optical deceptions, owing to the unequal refractions of the rays. For this there seems to be no remedy, except the introduction of achromatic glasses into microscopes as well as telescopes. How far this is practicable, hath not yet been tried; but when these glasses shall be introduced, (if such introduction is practicable), microscopes will then undoubtedly have received their ultimate degree of perfection.

With regard to telescopes, those of the refracting kind have evidently the advantage of all others, where the aperture is equal, and the aberrations of the rays are corrected according to Mr Dollond's method; because the image is not only more perfect, but a much greater quantity of light is transmitted than what can be reflected from the best materials hitherto known. Unluckily, however, the imperfections of the glass set a limit to these telescopes, as hath already been observed, so that they cannot be made above three feet and an half long. On the whole, therefore, the reflecting telescopes are preferable in this respect, that they may be made of dimensions greatly superior; by which means they can both magnify to a greater degree, and at the same time throw much more light into the eye.

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With regard to the powers of telescopes, however, they are all of them exceedingly less than what we would be apt to imagine from the number of times which they magnify the object. Thus, when we hear of a telescope which magnifies 200 times, we are apt to imagine, that, on looking at any distant object through it, we should perceive it as distinctly as we would with our naked eye at the 200th part of the distance. But this is by no means the case; neither is there any theory capable of directing us in this matter: we must therefore depend entirely on experience.

The best method of trying the goodness of any telescope is by observing how much farther off you are able to read with it than you can with the naked eye. But that all deception may be avoided, it is proper to choose something to be read where the imagination cannot give any assistance, such as a table of logarithms, or something which consists entirely of figures; and hence the truly useful power of the telescope is easily known. In this way Mr Short's large telescope, which magnifies the diameter of objects 1200 times, is yet unable to afford sufficient light for reading at more than 200 times the distance at which we can read with our naked eye.

With regard to the form of reflecting telescopes, in is now pretty generally agreed, that when the Gregorian ones are well constructed, they have the advantage of those of the Newtonian form. One advantage evident at first sight is, that with the Gregorian telescope an object is perceived by looking directly thro' it, and consequently is found with much greater ease than in the Newtonian telescope, where we must look into the side. The unavoidable imperfection of the specula common to both, also gives the Gregorian an advantage over the Newtonian form. Notwithstanding the utmost care and labour of the workmen, it is found impossible to give the metals either a perfectly spherical, or a perfectly parabolical form. Hence arises some indistinctness of the image formed by the great speculum, which is frequently corrected by the little one, provided they are properly matched. But if this is not done, the error will be made much worse: and hence many of the Gregorian telescopes are far inferior to the Newtonian ones; namely, when the specula have not been properly adapted to each other. There is no method by which the workman can know the specula which will fit one another, without a trial; and therefore there is a necessity for having many specula ready made of each sort, that in fitting up a telescope those may be chosen which best suit each other.

The brightness of any object seen through a telescope, in comparison with its brightness when seen by the naked eye, may in all cases be easily found by the following formula. Let n represent the natural distance of a visible object, at which it can be distinctly seen; and let d represent its distance from the object-glass of the instrument. Let m be the magnifying power of the instrument; that is, let the visual angle subtended at the eye by the object when at the distance n , and viewed without the instrument, be to the visual angle produced by the instrument as 1 to m . Let a be the diameter of the object-glass, and p be that of the pupil. Let the instrument be so constructed, that no parts of the pencils are intercepted for want of sufficient

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Formulas
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viewed by
telescopes,
or micro-
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cient apertures of the intermediate glasses. Lastly, let the light lost in reflection or refraction be neglected. The brightness of vision through the instrument will be expressed by the fraction $\frac{a^2 n^3}{m p d}$, the brightness of natural vision being 1. But although this fraction may exceed unity, the vision through the instrument will not be brighter than natural vision. For, when this is the case, the pupil does not receive all the light

transmitted through the instrument.
In microscopes, n is the nearest limits of distinct vision, nearly 8 inches. But a difference in this circumstance, arising from a difference in the eye, makes no change in the formula, because m changes in the same proportion with n .
In telescopes, n and d may be accounted equal, and the formula becomes $\frac{a^2}{m p}$.

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Optimates

Oracle.

Oracle.

OPTIMATES, in Roman antiquity, were, according to Tully, the best citizens, who desired that their actions might be approved of by the better sort; as the *Populares* were those who, out of a thirst of vain glory, did not so much consider what was right, as what would please the populace.

OPUNTIA, INDIAN FIG, or *Prickly Pear*. This plant is by Linnaeus joined to the genus of *Cactus*; though, for reasons given under that article, we have chosen to consider it as a genus by itself. There are nine species, all natives of warm climates. The most remarkable are, 1. The vulgaris, or common Indian fig. This is found in the warm parts of Europe as well as in America, and grows wild on the sides of the roads in Sicily, Naples, and Spain; but it is probable that the seeds of it may have been brought thither from America. This has oval or roundish branches, compressed on their two sides flat, and have small leaves coming out in knots on their surface, as also on their upper edges, which fall off in a short time; and at the same knots are three or four sharp spines, which do not appear unless they are closely viewed; but, on being handled, they enter the flesh, separate from the plant, and so are very troublesome and difficult to get out. The branches spread near the ground, and frequently trail upon it, putting out new roots; so are extended to a considerable distance, and never rise in height: these are fleshy and herbaceous while young; but, as they grow old, become drier, of a tough texture, and have ligneous fibres. The flowers come out on the upper edges of the branches, though sometimes they are produced on their sides: these sit upon the embryo of the fruit, and are composed of several roundish concave petals, which spread open. They are of pale yellow colour, and appear in July and August. They are succeeded by an oblong fruit, whose skin or cover is set with small spines in clusters, and the inside is fleshy, of a purple or red colour, in which are lodged many black seeds. 1. The *cochinifera*, or cochineal fig; so called from its being the food of the cochineal insect. It hath oblong, smooth, green branches, which grow erect to the height of 8 or 10 feet, with but very few spines, and these so soft that they are not troublesome when handled. The flowers of this are of a purple colour; and sit on the embryo of the fruit, like those of the former sort, but do not expand like them. This kind grows naturally in Jamaica; where it is probable that the true cochineal might be discovered if persons of skill were to search for it. The vulgaris is the only kind which can be raised in this country without great difficulty; and may be propagated by slips, in a light mould.

OR, the French word for *gold*, by which metal is expressed in heraldry. In engraving it is denoted by small points all over the field or bearing. It may be supposed to signify of itself, *generosity, splendour, or solidity*; according to G. Leigh, if it is compounded with

Gul.	} If dignities	Courage.
Azu.		Trust.
Vor.		Joy.
Pur.		Charity.
Sab.		Constancy.

ORACH. See ATRIPEX.

ORACLE, among the heathens, was the answer

which the gods were supposed to give to those who consulted them upon any affair of importance. It is also used for the god who was thought to give the answer, and the place where it was given.

The credit of oracles was so great, that in all doubts and disputes their determinations were held sacred and inviolable: whence vast numbers flocked to them for advice about the management of their affairs; and no business of any consequence was undertaken, scarce any peace concluded, any war waged, or any new form of government instituted, without the advice and approbation of some oracle. The answers were usually given by the intervention of the priest or priestesses of the god who was consulted; and generally expressed in such dark and unintelligible phrases, as might be easily wrested to prove the truth of the oracle, whatever was the event. It is not, therefore, to be wondered at, that the priests who delivered them were in the highest credit and esteem, and that they improved this reputation greatly to their advantage. They accordingly allowed no man to consult the gods, before he had offered costly sacrifices, and made rich presents to them. And to keep up the veneration for their oracles, and to prevent their being taken unprepared, they admitted persons to consult the gods only at certain stated times; and sometimes they were so cautious, that the greatest personages could obtain no answer at all. Thus Alexander himself was peremptorily denied by the pythia, or priestess of Apollo, till she was by downright force obliged to ascend the tripod; when, being unable to resist any longer, she cried out, *Thou art invincible*: and these words were accepted instead of a farther oracle.

Of the ambiguity of oracles, the following, out of a great many examples, may be mentioned. Croesus having received from the pythonefs this answer, That by passing the river Halys, he would destroy a great empire; he understood it to be the empire of his enemy, whereas he destroyed his own.—The oracle consulted by Pyrrhus gave him an answer, which might be equally understood of the victory of Pyrrhus, and the victory of the Romans his enemies:

Aio te, Eacida, Romanos vincere posse.

The equivocation lies in the construction of the Latin tongue, which cannot be rendered in English.—The pythonefs advised Croesus to guard against the mule. The king of Lydia understood nothing of the oracle, which denoted Cyrus descended from two different nations; from the Medes, by Mandana his mother, the daughter of Astyages; and from the Persians, by his father Cambyfes, whose race was by far less grand and illustrious.—Nero had for answer, from the oracle of Delphos, that seventy-three might prove fatal to him. He believed he was safe from all danger till that age; but, finding himself deserted by every one, and hearing Galba proclaimed emperor, who was 73 years of age, he was sensible of the deceit of the oracle.

When men began to be better instructed by the lights philosophy had introduced into the world, the false oracles insensibly lost their credit. Chrypsippus filled an entire volume with false or doubtful oracles. Oenomaus, to be revenged of some oracle that had deceived him, made a compilation of oracles, to shew their ridicule and vanity. Eusebius has preserved some

some fragments of this criticism on oracles by Oenomaus. "I might (says Origen) have recourse to the authority of Aristotle and the Peripatetics, to make the Pythones much suspected; I might extract from the writings of Epicurus and his sectators an abundance of things to discredit oracles; and I might shew that the Greeks themselves made no great account of them."

The reputation of oracles was greatly lessened when they became an artifice of politics. Themistocles, with a design of engaging the Athenians to quit Athens, and to embark, in order to be in a better condition to resist Xerxes, made the Pythones deliver an oracle, commanding them to take refuge in wooden walls. Demosthenes said, that the Pythones *Philippised*; to signify that she was gained over by Philip's presents.

The cessation of oracles is attested by several prophane authors; as Strabo, Juvenal, Lucan, and others. Plutarch accounts for the cause of it, either that the benefits of the Gods are not eternal as themselves are; or that the genii, who presided over oracles, are subject to death; or that the exhalations of the earth had been exhausted. It appears that the last reason had been alleged in the time of Cicero, who ridicules it in his second book of Divination, as if the spirit of prophecy, supposed to be excited by subterraneous effluvia, had evaporated by length of time, as wine or pickle by being long kept.

Suidas, Nicephorus, and Cedrenus, relate, that Augustus, having consulted the oracle of Delphos, could obtain no other answer but this: "The Hebrew child whom all the Gods obey, drives me hence, and sends me back to hell: get out of this temple without speaking one word." Suidas adds, that Augustus dedicated an altar in the Capitol with this inscription, "To the eldest Son of God." Notwithstanding these testimonies, the answer of the oracle of Delphos to Augustus seems very suspicious. Cedrenus cites Eusebius for this oracle, which is not now found in his works; and Augustus's peregrination into Greece was 18 years before the birth of Christ.

Suidas and Cedrenus give an account also of an ancient oracle delivered to Thulis, a king of Egypt, which they say is well authenticated. The king having consulted the oracle of Serapis, to know if there ever was, or would be, one so great as himself, received this answer: "First, God, next the Word, and the Spirit with them. They are equally eternal, and make but one, whose power will never end. But thou, mortal, go hence, and think that the end of the life of man is uncertain."

Van Dale, in his treatise of oracles, does not believe that they ceased at the coming of Christ. He relates several examples of oracles consulted till the death of Theodosius the Great. He quotes the laws of the emperors Theodosius, Gratian, and Valentinian, against those who consulted oracles, as a certain proof that the superstition of oracles still subsisted in the time of those emperors.

According to others, the opinion of those who believe that the demons had no share in the oracles, and that the coming of the Messiah made no change in them, and the contrary opinion of those who pretend that the incarnation of the Word imposed a general

silence on all oracles, should be equally rejected. They allege, that two sorts of oracles ought to be distinguished: the one dictated by the spirits of darkness, who deceived men by their obscure and doubtful answers; the other, the pure artifice and cheat of the priests of false divinities. As to the oracles given out by demons, the reign of Satan was destroyed by the coming of the Saviour; truth shut the mouth of lies; but Satan continued his old craft among idolaters. All the devils were not forced to silence at the same time by the coming of the Messiah; it was on particular occasions that the truth of Christianity, and the virtue of Christians, imposed silence on the devils. St Athanasius tells the Pagans, that they have been witnesses themselves that the sign of the cross puts the devils to flight, silences oracles, and dissipates enchantments. This power of silencing oracles, and putting the devils to flight, is also attested by Arnobius, Lactantius, Prudentius, Minutius Felix, and several others. Their testimony is a certain proof that the coming of the Messiah had not imposed a general silence on oracles.

Plutarch relates, that the pilot Thamus heard a voice in the air, crying out, "The great Pan is dead;" whereupon Eusebius observes, that the accounts of the death of the demons were frequent in the reign of Tiberius, when Christ drove out the wicked spirits.

The same judgment, it is said, may be passed on oracles as on *possessioners*. It was on particular occasions, by the divine permission, that the Christians cast out devils, or silenced oracles, in the presence, and even by the confession, of the Pagans themselves. And thus it is we should, it seems, understand the passages of St Jerom, Eusebius, Cyril, Theodoret, Prudentius, and other authors, who said that the coming of Christ had imposed silence on the oracles.

As to the second sort of oracles, which were pure artifices and cheats of the priests of false divinities, and which probably exceeded the number of those that immediately proceeded from demons, they did not cease till idolatry was abolished, though they had lost their credit for a considerable time before the coming of Christ. It was concerning this more common and general sort of oracles that Minutius Felix said, they began to discontinue their responses, according as men began to be more polite. But, however decried oracles were, impostors always found dupes, the grossest cheats having never failed.

Daniel discovered the imposture of the priests of Bel, who had a private way of getting into the temple to take away the offered meats, and who made the king believe that the idol consumed them.—Mundus, being in love with Paulina, the eldest of the priestesses of Isis, went and told her, that the god Anubis, being passionately fond of her, commanded her to give him a meeting. She was afterwards shut up in a dark room, where her lover Mundus, whom she believed to be the god Anubis, was concealed. This imposture having been discovered, Tiberius ordered those detestable priests and priestesses to be crucified, and with them Idea, Mundus's free-woman, who had conducted the whole intrigue. He also commanded the temple of Isis to be levelled with the ground, and her statue to be thrown into the Tiber; and, as to Mundus,

Oracles, he contented himself with fending him into banishment.

Theophilus, bishop of Alexandria, not only destroyed the temples of the false gods, but discovered the cheats of the priests, by shewing that the statues, some of which were of brass, and others of wood, were hollow within, and led into dark passages made in the wall.

Lucian, in discovering the impostures of the false prophet Alexander, says, that the oracles were chiefly afraid of the subtilties of the Epicureans and Christians. The false prophet Alexander sometimes feigned himself seized with a divine fury, and by means of the herb sowpewort, which he chewed, frothed at the mouth in so extraordinary a manner, that the ignorant people attributed it to the strength of the god he was possessed by. He had long before prepared a head of a dragon made of linen, which opened and shut its mouth by means of a horse-hair. He went by night to a place where the foundations of a temple were digging; and, having found water, either of a spring, or rain that had settled there, he hid in it a goose-egg, in which he had inclosed a little serpent that had been just hatched. The next day, very early in the morning, he came quite naked into the street, having only a scarf about his middle, holding in his hand a scythe, and tossing about his hair as the priests of Cybele; then getting a-top of a high altar, he said that the place was happy to be honoured by the birth of a god.—Afterwards, running down to the place where he had hid the goose-egg, and going into the water, he began to sing the praises of Apollo and Æsculapius, and to invite the latter to come and shew himself to men. With these words, he dips a bowl into the water, and takes out a mysterious egg, which had a god inclosed in it; and when he had it in his hand, he began to say that he held Æsculapius. Whilst all were eager to have a sight of this fine mystery, he broke the egg, and the little serpent starting out, twisted itself about his fingers.

These examples shew clearly, that both Christians and Pagans were so far agreed as to treat the *greater number* of oracles as purely human impostures.—That, in fact, ALL of them were so, will be concluded by those who give equal credit to demoniacal *inspiration*, and demoniacal *possession*. See the article POSSESSION (*Demoniacal*).

ORAL, something delivered by word of mouth, without being committed to writing; in which sense we say oral law, oral tradition, &c.

ORANGE OUTANG. See SIMIA.

ORANGE PEEL. See CITRUS and ORANGE-TREE.

ORAN, a very strong and important town of Africa, in Barbary, and in the kingdom of Tremecen, with several forts, and an excellent harbour. It is seated partly on the side of a hill, and partly on a plain, about a stone-cast from the sea, almost opposite to Carthage in Spain. It is about a mile and an half in circumference, and well fortified, but com-

manded by the adjacent hills. It was taken by the Spaniards in 1509, and retaken by the Algerines in 1708; but in 1732 the Spaniards became masters of it, and have continued so ever since. E. Long. ϕ . 5. N. Lat. 37. 40.

ORANGE, a famous city, and capital of a province of the same name, united to Dauphiny, with a university and a bishop's see. It is seated in a fine large plain, watered by a vast number of little rivulets on the east side of the river Rhone. It is a very large ancient place, and was considerable in the time of the Romans, who adorned it with several buildings, of which there are still some ruins left, particularly of an amphitheatre, and a triumphal arch, which is almost entire. This town was formerly much larger than it is at present, as appears from the traces of the ancient walls. The wall was in 1682 entirely demolished by order of Lewis XIV. and the inhabitants were exposed to the fury of the soldiers. The town was restored to king William by the treaty of Ryfwick; but after his death the French took it again, and expelled the protestant inhabitants. By the treaty of Utrecht it was confirmed to the crown of France, though the title is still retained in the house of Nassau. The principality is a very small district, it being only twelve miles in length and nine in breadth, and the revenue amounted to about 5000 l. a-year. The country is pleasant, and abounds with corn and fruit, but is exposed to violent winds. E. Long. ϕ . 51. N. Lat. 44. 21.

ORANGE-TREE, in botany. See the article CITRUS.—Orange-flowers are justly esteemed one of the finest perfumes; and though little used in medicine, yet the water distilled from them is accounted stomachic, cordial, and carminative. The fruit is cooling, and good in febrile disorders, and particularly in diarrhoeas. Orange-peel is an agreeable aromatic, proper to repair and strengthen the stomach, and give a very grateful flavour to any infusions or tinctures into whose compositions they enter. It is particularly useful in preparations of the bark; gives an agreeable warmth to the infusion; and, according to Dr Percival, considerably increases its virtue.

ORATION, in rhetoric, a speech or harangue, composed according to the rules of oratory, but spoken in public. Orations may be reduced to three kinds, viz. the demonstrative, deliberative, and judicial. To the demonstrative kind belong panegyrics, genethliaca, epithalamia, congratulations, &c. To the deliberative kind belong persuasion, exhortation, &c. And to the judicial kind belong accusation, consultation, &c.

ORATORIO, in the Italian music, a sort of sacred drama of dialogues; containing recitatives, duettos, trios, ritornellos, choruses, &c. The subjects of these pieces are usually taken from scripture, or the life of some saint, &c. The music for the oratorios should be in the finest taste and best chosen strains. These oratorios are greatly used at Rome in the time of lent, and of late in England.

O R A T O R Y;

The art of speaking well upon any subject, in order to persuade.

INTRODUCTION.

§ 1. *Of the Rise and Progress of Oratory.*

THE invention of oratory is by the Egyptians, and the fables of the poets, ascribed to Mercury. And it is well known, that the Greeks made their deities the authors likewise of other arts, and supposed that they presided over them. Hence they gave Mercury the titles of *Ἀγρεύς* and *Ἑρμῆς*, both which names come words that signify "to speak." And Aristides calls eloquence *the gift of Mercury*; and for the same reason anciently the tongue was consecrated to him. He was likewise said to be the interpreter or messenger of the gods; which office very well suited him, as he excelled in eloquence. Hence we read in the Sacred Writings, that when the people of Lystra took Barnabas and Paul for gods in human shape, because of that sudden and surprising cure which was wrought upon the lame man, they called Barnabas *Jupiter*, and Paul *Mercury*; for this reason, as the inspired writer tells us, 'because he was the chief speaker,' that is (as the spectators then thought) the interpreter or spokesman of Barnabas.

But to pass over these fictions of the heathen deities, let us hear what Quintilian says of the *origin* of this art; who seems to give a very probable account of it in the following passage. 'The faculty of speech (says he) we derive from nature; but the art from observation. For as in physic, men, by seeing that some things promote health and others destroy it, formed the art upon those observations; in like manner, by perceiving that some things in discourse are said to advantage, and others not, they accordingly marked those things, in order to imitate the one, and avoid the other. They also added some things from their own reason and judgment, which being confirmed by use, they began to teach others what they knew themselves.' But no certain account can be given when, or by whom, this method of observation first began to take place. And Aristotle supposes, not without reason, that the first lineaments of the art were very rude and imperfect. Pausanias, indeed, in his *Description of Greece*, tells us, that Pitheus, the uncle of Theseus, taught it at Trezene a city of Peloponnesus, and wrote a book concerning it; which he read himself, as it was published by one of Epidaurus. But as Pitheus lived above 1000 years before Pausanias, who flourished in the time of the emperor Hadrian, some are of opinion he might be imposed upon by the Epidaurians, who published this book under the name of *Pitheus*. But be that as it will, it is very reasonable to believe, that the Greeks had the principles of this art so early as the time of Pitheus. For Theseus his nephew lived not long before the taking of Troy, which, according to Sir Isaac Newton, happened 604 years before the birth of Christ; at which time Cicero thought it was in much esteem among them. 'Homer (says he) would never have given Ulysses and Nestor in the Trojan wars so great commendations on account of their speeches

(to one of whom he attributes force, and to the other sweetness of expression) if eloquence had not in those times been in great repute.' And left any one should imagine, that in those days they made use only of such helps as nature and practice could afford them; the same poet informs us, that Peleus sent Phenix with his son Achilles to the Trojan war, to instruct him not only in the art of war, but likewise of eloquence. But who were the professors of this art for some ages following, is not known. For Quintilian says, that afterwards Empedocles is the first upon record, who attempted any thing concerning it. And he, by Sir Isaac Newton's account, flourished about 500 years after Troy was taken. At which time, as Cicero observes, men being now sensible of the powerful charms of oratory, and the influence it had upon the mind, there immediately arose several masters of it; the chief of whom are mentioned by Quintilian, who tells us, that 'the oldest writers upon this art are Corax and Tisias, both of Sicily. After them came Gorgias of Leontium in the same island, who is said to have been the scholar of Empedocles, and by reason of his great age (for he lived to be 109 years old) had many contemporaries. Thrasymachus of Chalcedon, Prodicus of Cea, Protagoras of Abdera, Hippas of Elis, and Alcidas of Elea, lived in his time; as likewise Antiphon, who first wrote orations, and also upon the art, and is said to have spoken admirably well in his own defence; and besides these, Polycrates, and Theodore of Byzantium.' These persons contributed different ways towards the improvement of the art. Corax and Tisias gave rules for methodizing a discourse, and adjusting its particular parts; as may be conjectured from Cicero's account of them, who says, 'Though some had spoke well before their time, yet none with order and method.' But Gorgias seems to have excelled all the rest in fame and reputation: for he was so highly applauded by all Greece, that a golden statue was erected to him at Delphos, which was a distinguishing honour conferred upon him only. And he is said to have been so great a master of oratory, that in a public assembly he would undertake to declaim immediately upon any subject proposed to him. He wrote, as Cicero informs us, in the demonstrative or laudatory way; which requires most of the sublime, and makes what Diodorus Siculus says of him the more probable, that 'he first introduced the strongest figures, members of periods opposite in sense, of an equal length, or ending with a like sound, and other ornaments of that nature.' And hence those figures, which give the greatest force and lustre to a discourse, were anciently called by his name. Cicero tells us further, that Thrasymachus and Gorgias were the first who introduced numbers into prose, which Isocrates afterwards brought to perfection. Quintilian likewise mentions Protagoras, Gorgias, Prodicus, and Thrasymachus, as the first who treated of common-places, and showed the use of them for the invention of arguments. Nor must we omit Plato, whose elegant dialogue upon this subject is still extant, which he entitles

Gorgias

Gorgias. For though he does not lay down the common rules of the art; yet he very well explains the nature of it, and maintains its true end and use against the generality of its professors, who had greatly perverted the original design of it. Thus by the study and industry of so many ingenious and great men, the art of oratory was then carried to a considerable height among the Grecians. Though many of those, who professed it in those times, employed their skill rather to promote their own reputation and applause, than to serve the real interests of truth and virtue. 'For they proposed in an arrogant manner (as Cicero says) to teach how a bad cause might be so managed, as to get the better of a good one.' That is, they would undertake to charm the ears and strike the passions of their hearers in so powerful a manner, by sophistical reasonings, turns of wit, and fine language, as to impose falsehood upon them for truth; than which nothing could be either more disingenuous in itself, or prejudicial to society.

But those who succeeded them, seem to have consulted better, both for their own honour, and that of their profession. Isocrates was the most renowned of all *Gorgias's* scholars, whom Cicero frequently extols with the highest commendations, as the greatest master and teacher of oratory; 'whose school (as he says) like the Trojan horse, sent forth abundance of great men.' Aristotle was chiefly induced to engage in this province from an emulation of his glory; and would often say in a verse of Sophocles, somewhat varied to his purpose,

To be silent it is a shame;

While Isocrates gets such fame.

Quintilian says they both wrote upon the art, though there is no system of the former now extant. But that of Aristotle is esteemed the best and most complete of any in the Greek language. In this age the Grecian eloquence appeared in its highest perfection. Demosthenes was an hearer both of Isocrates and Plato, as also of *Isæus* (ten of whose orations are yet extant); and by the assistance of a surprising genius, joined with indefatigable industry, made that advantage of their precepts, that he has been always esteemed by the best judges the prince of Grecian orators. His great adversary and rival *Æschines*, after his banishment is said to have gone to Rhodes, and employed his time there in teaching of rhetoric. Theodectes and Theophrastus, both of them scholars of Aristotle, imitated their master in writing upon the art. And from that time the philosophers, especially the stoics and peripatetics, applied themselves to lay down the rules of oratory; which Socrates had before separated from the province of a philosopher. And there is yet preserved a treatise upon this subject, which some have ascribed to Demetrius Phalereus the peripatetic, and scholar of Theophrastus, though others more probably to Dionysius of Halicarnassus. Quintilian mentions several other famous rhetoricians in the following ages, who were likewise writers; as Hermagoras, Athenæus, Apollonius Molon, Areus Cæcilius, Dionysius of Halicarnassus, Apollonius of Pergamus, and Theodorus of Gadara. But of these nothing now remains upon the subject of oratory, except some tracts of Dionysius, who flourished in the reign of Augustus Cæsar. Nor have there been wanting some eminent

writers of this kind among the Greeks since the time of Quintilian; two of whom we cannot omit to mention, Hermogenes, and Longinus the author of the incomparable treatise *Of the Sublime*, a book which can scarce be too much commended or too often read.

It was long before Rome received this art, and not without difficulty at first. The reason was, because the Romans were for several ages wholly addicted to military affairs, and to enlarge their territories; so that they not only neglected to cultivate learning, but thought the pursuit of it a thing of ill tendency, by diverting the minds of their youth from the cares and toils of war, to a more soft and indolent kind of life. Therefore so late as the year of their city 592, when by the industry of some Grecians the liberal arts began to flourish in Italy, a decree passed the senate, by which all philosophers and rhetoricians were ordered to depart out of Rome. But in a few years after, when Carneades, Critolaus, and Diogenes, who were not only philosophers but orators, came ambassadors from Athens to Rome; the Roman youth were so charmed with the eloquence of their harangues, that they could no longer be kept from pursuing the study of oratory. And by a further acquaintance with the Greeks, it soon gained such esteem, that persons of the first quality employed their time and pains to acquire it. And a young gentleman, who was ambitious to advance himself in the service of his country, could have little hopes of success, unless he had laid the foundation of his future prospects in that study.

Seneca tells us, that Lucius Plotius, a Gaul, was the first who taught the art of oratory at Rome in Latin; which Cicero says, was while he was a boy; and when the most studious persons went to hear him, he lamented that he could not go with them; being prevented by the regard he paid to the opinion of some of his friends, who thought that greater improvements were made by exercises in the Greek language under Grecian masters. Seneca adds, that this profession continued for some time in the hands of freedmen; and that the first Roman who engaged in it was Blandus of the equestrian order, who was succeeded by others; some of whose lives are yet extant, written by Suetonius, as many of the Grecians are by Philostratus and Eunapius. Quintilian likewise gives us the names of those among the Romans, who wrote upon the art. 'The first (says he) as far as I can learn, who composed any thing upon this argument, was M. Cato the censor. After him Anthony the orator began upon the subject, which is the only work he has left, and that imperfect. Then followed some of less note. But he who carried eloquence to its highest pitch among us, was Cicero; who has likewise by his rules given the best plan both to practise and teach the art. After whom modesty would require us to mention no more, had he not told us himself, that his books of rhetoric slipped out of his hands, while he was but a youth. And those lesser things, which many persons want, he has purposely omitted in his discourses of oratory. Cornificius wrote largely upon the same subject; Stertinius and Gallio the father, each of them something. But Celsus and Lenas were more accurate than Gallio; and in our times Virginius, Pliny, and Rutilius. And there are at this day some celebrated authors of the same kind, who, if they had

taken

taken in every thing, might have saved my pains.' Time has since deprived us of most of the writers mentioned here by Quintilian. But we have the less reason to regret this loss, since it has preserved to us Cicero's treatises upon this subject; which we may well suppose to have been chiefly owing to their own excellency, and the great esteem they have always had in the world. Besides his *Two books of Invention*, which Quintilian here calls his *Books of Rhetoric*, there are extant of his, *Three books of an Orator*; one *Of famous Orators*; and another, which is called *The Orators*; as also his *Topics*, a preface *Concerning the best sort of Orators*, and a treatise *Of the parts of Oratory*. Each of which treatises, whether we regard the justness and delicacy of the thoughts, the usefulness of the rules, or the elegance and beauty of the style, deserve to be frequently perused by all who are lovers of eloquence. For who can be thought so well qualified to give the rules of any art, as he who excelled all mankind in the practice of them? But those *Four books to Herennius*, which are published among Cicero's works, seem with good reason to be attributed to Cornificus, whom Quintilian here mentions. And Celsus is by some affirmed to have taught oratory, whom he also places among the rhetoricians, and whose *Eight books of Medicine* are yet extant, written in so beautiful a style as plainly shews him to be a master of eloquence. But Quintilian himself outdid all who went before him in diligence and accuracy as a writer. His *Institutions* are so comprehensive, and written with such great exactness and judgment, that they are generally allowed to be the most perfect work of the kind. With this excellent author we shall finish the account of the Latin rhetoricians.

There were indeed some others in the following ages, whose works are yet extant; but as they contain nothing of moment, which is not to be found in those already mentioned, we shall forbear to name them. Much less shall we descend to that numerous body of writers, who since the revival of learning have treated upon this subject, for the same reason. And a very good judge* has not long since given it as his opinion, that the method of forming the best system of oratory, is to collect it from the finest precepts of Aristotle, Cicero, Quintilian, Longinus, and other celebrated authors; with proper examples taken from the choicest parts of the purest antiquity. And this is the method attempted to be pursued in the following treatise.

§ 2. Of the Nature of Oratory.

THE terms *rhetoric* and *oratory*, having no other difference but that one is taken from the Greek language and the other from the Latin, may be used promiscuously; but the case is not the same with respect to the words *rhetorician* and *orator*. For although the Grecians used the former, both to express those who taught the art, and those who practised it; yet the Romans afterward, when they took that word into their language, confined it to the teachers of the art, and called the rest *orators*. And there seems to have been a sufficient reason for this distinction, since the art was the same in both, and might therefore go by either name; but the different province of rhetoricians and orators made it not improper they should be called

by different names. Besides, anciently, before rhetoric was made a separate and distinct art from philosophy, the same persons taught both. And then they were called not only *rhetoricians*, but *sophists*. But because they often employed their art rather to vindicate what was false and unjust, than to support truth and virtue: this dissingenuous conduct, by which they frequently imposed upon weak minds, brought a discredit both upon themselves and their profession. And therefore the name *sophist*, or *sophistaster*, has been more generally used in an ill sense, to signify one skilled rather in the arts of cavilling, than qualified to speak well and accurately upon any subject.

It is not necessary to use many words, to prove that oratory is an art. For it is comprised under certain rules, agreeable to reason, delivered in a regular method, and suited to attain the end it proposes; which are characters sufficient to denominate it an art. Indeed the case is the same here, as in most other things, that a good genius is of itself more serviceable, than the most exact acquaintance with all the rules of art, where that is wanting. But it is sufficient that art help nature, and carry it farther than it can otherwise advance without it. And he who is desirous to gain the reputation of a good orator, will find the assistance of both very necessary. Some persons have thought, that many of the common systems written upon the subject of oratory have been attended with this inconvenience, that by burdening the mind with too great a number of rules about things of less importance, they have oftentimes rather discouraged than promoted the study of eloquence. This undoubtedly is extreme which should be always carefully avoided. But however, an indifferent guide in a strange road is better than none at all. It may be worth while to hear Quintilian's opinion upon this head. "I would not (says he) have young persons think they are sufficiently instructed, if they have learned one of those compend which are commonly handed about, and fancy themselves safe in the decrees, as it were, of these technical writers. The art of speaking requires much labour, constant study, a variety of exercise, many trials, the greatest prudence, and readiness of thought. However, these treatises are useful, when they set you in a plain and open way, and do not confine you to one narrow tract, from which he who thinks it a crime to depart must move as slowly as one that walks upon a rope." We see he is not for having us confine ourselves too closely to systems, though he thinks they are of service at first, till use and experience render them less necessary.

The business of oratory is to teach us to speak well; which, as Cicero explains it, is to speak *justly, methodically, floridly, and copiously*.

Now, in order to speak *justly*, or pertinently, a person must be master of his subject, that he may be able to say all that is proper, and avoid whatever may appear foreign and trifling. And he must clothe his thoughts with such words and expressions, as are most suited to the nature of the argument, and will give it the greatest force and evidence.

And as it teaches to speak *justly*, so likewise *methodically*. This requires, that all the parts of a discourse be placed in their proper order, and with such just connection, as to reflect a light upon each other, and thereby

thereby to render the whole both clear in itself, and easy to be retained. But the same method is not proper for all discourses. And very frequently a different manner is convenient in handling the same subject. For it is plain, that art, as well as nature, loves variety; and it discovers the speaker's judgment, when the disposition of his discourse is so framed, as to appear easy and natural, rather than the effect of industry and labour.

To speak *floridly*, is so peculiar a property of this art, that some have wholly confined it to the pomp and ornaments of language. But that it extends farther, and respects things as well as words, we shall have occasion to shew hereafter. It contains indeed the whole subject of elocution, but does not wholly consist in it. True and solid eloquence requires not only the beauties and flowers of language; but likewise the best sense and clearest reasoning. Besides, rhetoric gives rules for the several sorts of style, and directs the use of them agreeably to the nature of the subject.

But the force of oratory appears in nothing more, than a *copiousness* of expression, or a proper manner of enlargement, suited to the nature of the subject; which is of great use in persuasion, and forms the last property, required by Cicero, of speaking well. A short and concise account of things is often attended with obscurity, from an omission of some necessary circumstances relating to them. Or, however, where that is not the case, yet for want of proper embellishments to enliven the discourse, and thereby to excite and fix the hearers attention, it is apt to slip through their minds without leaving any impression. But where the images of things are drawn in their full proportion, painted in their proper colours, set in a clear light, and represented in different views, with all the strength and beauties of eloquence, they captivate the minds of the audience with the highest pleasure, engage their attention, and by an irresistible force move and bend them to the design of the speaker.

The principal end and design of oratory is to persuade. For which reason it is frequently called the *art of persuasion*. Indeed the orator has often other subordinate views; as when he endeavours either to delight his hearers with what is pleasant and agreeable, or to conciliate their good opinion by a smooth and

artful address: but still both these are in order to persuade and excite them to action.

And while the orator employs his art in pursuing only those ends for which it was at first designed, the persuading men to good and virtuous actions, and dissuading them from every thing that is ill and vicious; nothing can be more commendable in itself, or useful to human societies.

§ 3. Of the Division of Oratory.

ORATORY consists of four parts; *invention, disposition, elocution, and pronunciation*. This will appear by considering the nature of each of them, and what it contributes in forming an orator. Every one who aims to speak well and accurately upon any subject, does naturally in the first place inquire after and pursue such thoughts as may seem most proper to explain and illustrate the thing upon which he designs to discourse. And if the nature of it requires that he should bring reasons to confirm what he says, he not only seeks the strongest, and such as are like to be best received; but also prepares to answer any thing which may be offered to the contrary. This is *invention*. After this he deliberates with himself in what method to dispose of those things which have occurred to his mind, that they may appear in the plainest light, and not lose their force by disorder and confusion. This is the business of *disposition*. His next concern is to give his thoughts an agreeable dress; by making choice of the fittest words, clearest expressions, smooth and harmonious periods, with other ornaments of style, as may best suit the nature of his subject, brighten his discourse, and render it most entertaining to his hearers. And this is called *elocution*. The last thing he attends to, is to deliver what he has thus composed, with a just and agreeable *pronunciation*. And daily experience convinces us, how much this contributes both to engage the attention, and impress what is spoken upon the mind. This then is the method to which nature directs, in order to qualify ourselves for discoursing to the best advantage: Though by custom and habit these things become so familiar to us, that we do not always attend to them separately in their natural order. However, it is the business of art to follow nature, and to treat of things in that manner which she dictates.

PART I. OF INVENTION.

CHAP. I. Of Invention in general; and particularly of Common Places, and State of a Cause.

INVENTION, considered in general, is the discovery of such things as are proper to persuade. And in order to attain this end, the orator proposes to himself three things: To prove or illustrate the subject upon which he treats; to conciliate the minds of his hearers; and to engage their passions in his favour. And as these require different kinds of arguments or motives, invention furnishes him with a supply for each of them, as will be shewn in their order.

An argument, as defined by Cicero, is a reason, which induces us to believe, what before we doubted of.

And as different kinds of discourses require different arguments, rhetoricians have considered them two ways; in general, under certain heads, as a common fund for all subjects; and in a more particular manner, as they are suited to *demonstrative, deliberative, or judicial* discourses. At present we shall treat only upon the former of these. And now, that one thing may receive proof and confirmation from another, it is necessary that there be some relation between them; for all things are not equally adapted to prove one another. Thus, in measuring the quantity of two things which we would shew, to be either equal or unequal, if they are of such a nature that one cannot be applied to the other, then we take a third thing, which may be applied to them both; and that must be equal at least

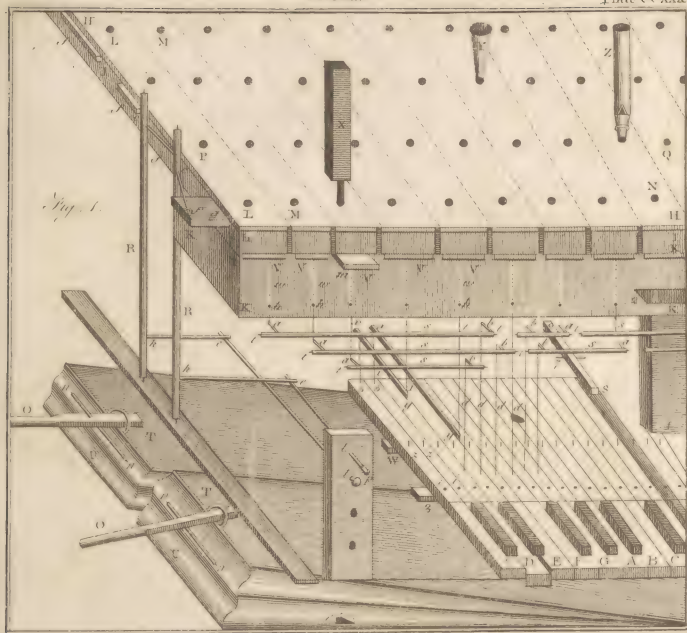


Fig. 2.



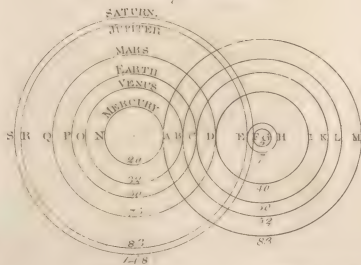
Fig. 3.



Fig. 4.



Fig. 5. ORREERY.



D. *Branch of the gun.*
 G. *Drill Pipe.*
 H. *Coupo Troque Teller.*

Fig. 1.
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 ORDNANCE.

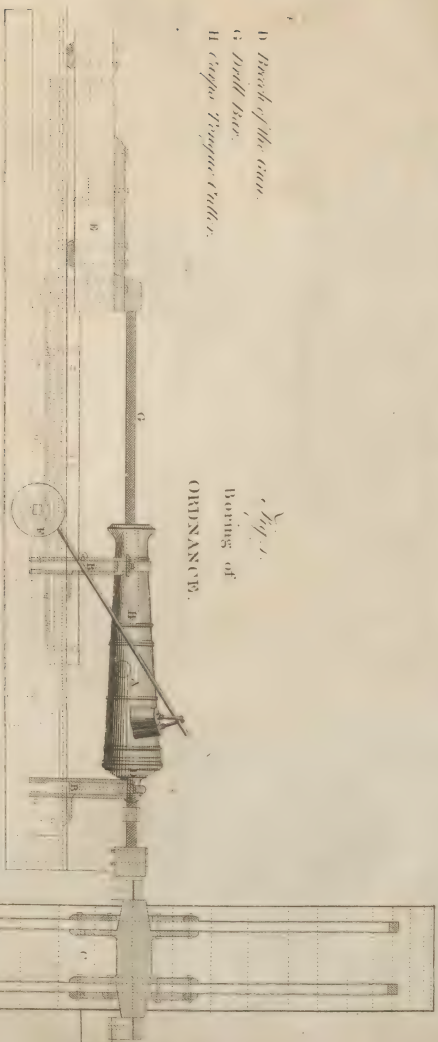


Fig. 2.
 PENDULUM.

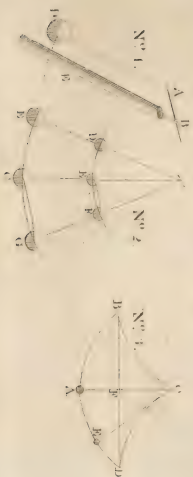
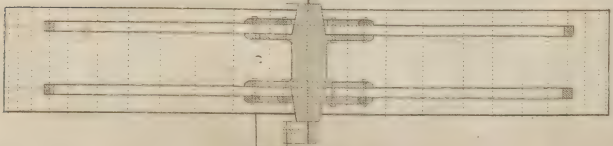
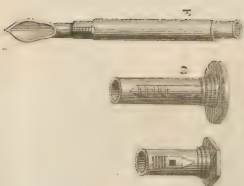


Fig. 3. Fountain
 PEN.



least to one of the two, which if applied to the other, and found equal to that also, we presently conclude that those two things are equal; but if it be unequal to the other, we say that those two things are unequal. Because it is the certain and known property of all quantities, that whatsoever two things are equal to a third, are equal to one another; and where one of any two things is equal to a third, and the other unequal, those two things are unequal to one another. What has been said of quantities, will hold true in all other cases, that so far as any two things or ideas agree to a third, so far they agree to one another. So likewise, on the contrary, as far as one of any two things or ideas does agree to a third, and the other does not, so far they disagree with one another; in which respect, one of them cannot be truly affirmed of the other. Since, therefore, in every proposition, one thing is spoken of another, if we would find out whether the two ideas agree to each other or not, where this is not evident of itself, we must find out some third thing, the idea of which agrees to one of them; and then that being applied to the other, as it does agree or disagree with it, so we may conclude, that the two things proposed do agree or disagree with one another. This will be made more clear by an example or two. Should it be inquired, *Whether virtue is to be loved*; the agreement between virtue and love might be found by comparing them separately with happiness, as a common measure to both. For since the idea of happiness agrees to that of love, and the idea of virtue to that of happiness; it follows, that the ideas of virtue and love agree to one another: and therefore it may be affirmed, *That virtue is to be loved*. But on the contrary, because the idea of misery disagrees with that of love, but the idea of vice agrees to that of misery, the two ideas of vice and love must consequently disagree with one another; and therefore it would be false to assert, *That vice is to be loved*. Now, this third thing logicians call the *medium*, or *middle term*, because it does as it were connect two extremes; that is, both parts of a proposition. But rhetoricians call it an *argument*, because it is so applied to what was before proposed, as to become the instrument of procuring our assent to it. Thus far as to the nature and use of arguments. We shall next explain by what methods they are to be sought.

A lively imagination, and readiness of thought, are undoubtedly a very great help to invention. Some persons are naturally endued with that quickness of fancy, and penetration of mind, that they are seldom at a loss for arguments either to defend their own opinions, or to attack their adversaries. However, these things being the gift of nature, and not to be gained by art, do not properly fall under our present consideration.

It will be readily granted, that great learning and extensive knowledge are a noble fund for invention. An orator therefore should be furnished with a stock of important truths, solid maxims of reason, and a variety of knowledge, collected and treasured up both from observation, and a large acquaintance with the liberal arts; that he may not only be qualified to express himself in the most agreeable manner, but likewise to support what he says with the strongest and clearest arguments.

But because all are not born with a like happy genius, and have not the same opportunity to cultivate their minds with learning and knowledge; and because nothing is more difficult than to dwell long upon the consideration of one thing, in order to find out the strongest arguments which may be offered for and against it; upon these accounts, art has prescribed a method to lessen, in some measure, these difficulties, and help every one to a supply of arguments upon any subject. And this is done by the contrivance of *common places*, which Cicero calls the *seats* or *heads* of arguments, and by a Greek name *topics*. They are of two sorts, *internal* and *external*.

I. Internal topics. Though things, with regard to their nature and properties, are exceedingly various, yet they have certain common relations, by means whereof the truth of what is either affirmed or denied concerning them in any respect may be evinced. The ancient Greek rhetoricians therefore reduced these relations to some general heads, which are termed *common places*; because the reasons or arguments suited to prove any proposition, are repositd in them, as a common fund or receptacle. And they are called *internal heads*, because they arise from the subject upon which the orator treats; and are therefore distinguished from others named *external*, which he fetches from without, and applies to his present purpose, as will be shewn hereafter. Cicero and Quintilian make them 16; three of which comprehend the whole thing they are brought to prove, namely, *definition, enumeration, and notation*: of the remaining 13, some contain a part of it, and the rest its various properties and circumstances, with other considerations relating to it; and these are, *genus, species, antecedents, consequents, adjuncts, conjugates, cause, effect, contraries, opposites, similitude, dissimilitude, and comparison*.

Definition explains the nature of the thing defined, and shews what it is. And to whatsoever the definition agrees, the thing defined does so likewise. If therefore Socrates be a rational creature, he is a man; because it is the definition of a man, that he is a rational creature.

Enumeration takes in all the parts of a thing. And from this we prove, that what agrees to all the parts, agrees to the whole; and what does not agree to any one or more parts, does not agree to the whole: As when Cicero proves to Piso that all the Roman state hated him, by enumerating the several ranks and orders of Roman citizens who all did so.

Notation, or etymology, explains the meaning or signification of a word. From which we reason thus: "If he cannot pay his debts, he is insolvent;" for that is the meaning of the word *insolvent*.

Genus is what contains under it two or more sorts of things, differing in nature. From this head logicians reason thus: "Because every animal is mortal, and man is an animal, therefore man is mortal." But orators make a further use of this argument, which they call *ascending from the hypothesis to the thesis*; that is, from a particular to a general: As should a person, when speaking in praise of justice, take occasion from thence to commend and shew the excellency of virtue in general, with a view to render that particular virtue more amiable. For since every species contains in it the whole nature of the genus to which it relates, besides what is peculiar to itself, whereby it is distinguished

Invention.

Invention.

guished from it; what is affirmed of the genus, must of necessity be applicable to the species.

Species is that which comprehends under it all the individuals of the same nature. From hence we may argue, "He is a man, therefore he has a rational soul." And orators sometimes take occasion from this head to descend from the thesis to the hypothesis: that is, in treating upon what is more general, to introduce some particular contained under it, for the greater illustration of the general.

Antecedents are such things, as, being once allowed, others necessarily, or very probably, follow. From this head an inseparable property is proved from its subject: as, It is material, and therefore corruptible.

Consequents are such things, as being allowed, necessarily, or very probably infer their antecedents. Hence the subject is proved from an inseparable property in this manner: It is corruptible, and therefore material.

Adjuncts are separable properties of things, or circumstances that attend them. These are very numerous, and afford a great variety of arguments, some of which usually occur in every discourse. They do not necessarily infer their subject; but, if fitly chosen, render a thing credible, and are a sufficient ground for assent. The way of reasoning from them we shall shew presently.

Conjugates are words deduced from the same origin with that of our subject. By these the habit is proved from its acts: as, He who does justly is just. He does not act wisely, therefore he is not wise. But this inference will not hold, unless the actions appear continued and constant.

A *cause* is that, by the force of which a thing does exist. There are four kinds of causes, matter, form, efficient, and end, which afford a great variety of arguments. The way of reasoning from them is to infer the effect from the cause: as, Man is endued with reason, therefore he is capable of knowledge.

An *effect* is that which arises from a cause, therefore the cause is proved by it: as, He is endued with knowledge, therefore with reason.

Contraries are things, which under the same genus are at the utmost distance from each other. So that what we grant to the one, we utterly deny the other: as, Virtue ought to be embraced, therefore vice should be avoided.

Opposites are such things, which, though repugnant to each other, yet are not directly contradictory: as, To love and to injure, to hate and to commend. They differ from contraries in this, that they do not absolutely exclude one another. An argument is drawn from things repugnant, thus: He will do a man a mischief, therefore he does not love him. He loves a man, therefore he will not reproach him.

Similitude is an agreement of things in quality. Thus Cicero proves, that pernicious citizens ought to be taken out of the state; by the likeness they bear to corrupted members, which are cut off to prevent further damage to the body.

Dissimilitude is a disagreement of things in quality. From this head Cicero shews the preference of his own exile to Piso's government of Macedonia; by the difference between their conduct, and the people's esteem of them.

Comparison is made three ways: for either a thing is compared with a greater, with a less, or with its equal. This place, therefore, differs from that of similitude on this account, that the quality was considered in that, but here the quantity. An argument from the greater is thus drawn: If five legions could not conquer the enemy, much less will two.

We shall just give one example of the manner of reasoning from these heads, whereby the use of them may further appear. If any one, therefore, should have endeavoured to persuade Cicero not to accept of his life upon the condition offered him by Antony, That he would burn his Philippic orations which had been spoken against him, he might be supposed to use such arguments as these; partly taken from the adjuncts of Cicero, partly from those of Antony, and partly from the thing itself. And first with regard to Cicero, it might be said, That so great a man ought not to purchase his life at so dear a price as the loss of that immortal honour which by so great pains and labour he had acquired. And this might be confirmed by another argument, That now he was grown old, and could not expect to live much longer. And from the character of Antony he might argue thus: That he was very crafty and deceitful; and only designed, by giving him hopes of life, to have the Philippics first burnt, which otherwise he knew would transmit to posterity an eternal brand of infamy upon him; and then he would take off the author. And this might be shewn by comparison. For since he would not spare others, who had not so highly exasperated him, and from whom he had not so much to fear; certainly he would not forgive Cicero, since he knew well enough, that so long as he lived, he himself could never be in safety. And, lastly, an argument might also be fetched from the nature of the thing itself in the following manner: That Cicero by this action would shamefully betray the state, and the cause of liberty, which he had through his whole life most courageously defended, with so great honour to himself, and advantage to the public. Upon such an account, a person might have used these or the like arguments with Cicero, which arise from the fore-mentioned heads.

From this account of common places, it is easy 5—(18) to conceive what a large field of discourse they open to the mind upon every subject. These different considerations furnish out a great number and variety of arguments, sufficient to supply the most barren invention. He can never be at a loss for matter, who considers well the nature of his subject, the parts of which it consists, the circumstances which attend it, the causes from whence it springs, the effects it produces, its agreement, disagreement, or repugnancy to other things; and in like manner carries it through all the remaining heads. But although this method will assist us very much to enlarge upon a subject, and place it in different views; yet a prudent man is not so desirous to say a great deal, as to speak to the purpose; and therefore will make choice of proper arguments, and such only as have a direct tendency to confirm or illustrate his subject. And for this end, it is necessary for him to gain, first a thorough knowledge of his subject, and then arguments will naturally spring up in his mind proper to support it: and if he

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be fill at a loss, and find occasion to have recourse to these heads, he will readily perceive from whence to take those which are best suited to his purpose.

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II. *Of external topics.* When the orator reasons from such topics as do not arise from his subject, but from things of a different nature, these are called *external*. They are all taken from authorities, and are by one general name called *Testimonies*.

Now a testimony may be expressed by writing, speech, or any other sign proper to declare a person's mind. And all testimonies may be distinguished into two sorts, divine and human. A divine testimony, when certainly known to be such, is incontestable, and admits of no debate, but should be acquiesced in without hesitation. Indeed the ancient Greeks and Romans esteemed the pretended oracles of their deities, the answers of their augurs, and the like fallacies, divine testimonies: but with us no one can be ignorant of their true notion, though they do not so directly come under our present consideration. Human testimonies, considered as furnishing the orator with arguments, may be reduced to three heads; *writings, witnesses, and contradi.*

I. *By Writings*, here, are to be understood written laws, wills, or other legal instruments, expressed and conveyed in that manner. And it is not so much the force and validity of such testimonies, considered in themselves, that is here intended, as the occasion of dispute which may at any time arise concerning their true design and import, when produced in proof upon either side of a controversy. And these are five; Ambiguity, Disagreement between the words and intention, Contrariety, Reasoning, and Interpretation.

A writing is then said to be ambiguous, when it is capable of two or more senses, which makes the writer's design uncertain. Now ambiguity may arise either from single words, or the construction of sentences. From single words; as when either the sense of a word, or the application of it, is doubtful. As, should it be questioned, whether ready money ought to be included under the appellation of chattels left by a will; or, if a testator bequeath a certain legacy to his nephew Thomas, and he has two nephews of that name. But ambiguity is also sometimes occasioned from the construction of a sentence; as when several things or persons having been already mentioned, it is doubtful to which of them that which follows ought to be referred. For example, a person writes thus in his will: 'Let my heir give as a legacy to Titius, an horse out of my stable, which he pleases.' Here it may be questioned, whether the word *he* refers to the heir or to Titius; and consequently, whether the heir be allowed to give Titius which horse he pleases, or Titius may choose which he likes best. Now as to controversies of this kind, in the first case above-mentioned, the party who claims the chattels may plead, that all moveable goods come under that name, and therefore that he has a right to the money. This he will endeavour to prove from some instances where the word has been so used. The business of the opposite party is to refute this, by shewing that money is not there included. And if either side produce precedents in his favour, the other may endeavour to shew the cases are not parallel. As to the second case, arising from an ambiguity in the name, if any other

words or expressions in the will seem to countenance either of the claimants, he will not fail to interpret them to his advantage. So likewise, if any thing said by the testator, in his lifetime, or any regard shewn to either of these nephews more than the other, may help to determine which of them was intended, a proper use may be made of it. And the same may be said with regard to the third case. In which the legatee may reason likewise from the common use of language, and shew, that in such expressions, it is usual to make the reference to the last or next antecedent; and from thence plead, that it was the design of the testator to give him the option. But in answer to this, it may be said, that allowing it to be very often so, yet in this instance it seems more easy and natural to repeat the verb *give* after *pleases*, and so to supply the sentence, *which he pleases to give him*, referring it to the heir, than to bring in the verb *choose*, which was not in the sentence before; and so, by supplying the sense, *which he pleases to choose*, to give the option to Titius. But where controversies of this kind arise from a law, recourse may be had to other laws where the same thing has been expressed with greater clearness; which may help to determine the sense of the passage in dispute.

A second controversy from writings is, when one party adheres to the words, and the other to what he asserts was the writer's intention. Now he who opposes the literal sense, either contends, that what he himself offers is the simple and plain meaning of the writing, or that it must be so understood in the particular case in dispute. An instance of the former is this, as we find it in Cicero. A person who died without children, but left a widow, had made this provision in his will: "If I have a son born to me, he shall be my heir." And a little after; "If my son die before he comes of age, let Curius be my heir." There is no son born: Curius therefore sues for the estate, and pleads the intention of the testator, who designed him for his heir, if he should have no son who arrived at age; and says, there can be no reason to suppose he did not intend the same person for his heir if he had no son, as if he should have one who afterwards died in his minority. But the heir at law insists upon the words of the will; which, as he says, require, that first a son should be born, and afterwards die under age, before Curius can succeed to the inheritance; and there being no son, a substituted heir, as Curius was, can have no claim where the first heir does not exist, from whom he derives his pretension, and was to succeed by the appointment of the will. Of the latter case, rhetoricians give this example: "It was forbidden by a law to open the city-gates in the night. A certain person notwithstanding, in time of war, did open them in the night, and let in some auxiliary troops, to prevent their being cut off by the enemy, who was posted near the town." Afterwards, when the war was over, this person is arraigned, and tried for his life on account of this action. Now, in such a case, the prosecutor founds his charge upon the express words of the law; and pleads, that no sufficient reason can be assigned for going contrary to the letter of it, which would be to make a new law, and not to execute one already made. The defendant, on the other hand, alleges, That the

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fact he is charged with cannot, however, come within the intention of the law; since he either could not, or ought not, to have complied with the letter of it in that particular case, which must therefore necessarily be supposed to have been excepted in the design of that law when it was made. But to this the prosecutor may reply, That all such exceptions as are intended by any law, are usually expressed in it: and instances may be brought of particular exceptions expressed in some laws; and if there be any such exception in the law under debate, it should especially be mentioned. He may further add, That to admit of exceptions not expressed in the law itself, is to enervate the force of all laws, by explaining them away, and in effect to render them useless. And this he may further corroborate, by comparing the law under debate with others, and considering its nature and importance, and how far the public interest of the state is concerned in the due and regular execution of it; from whence he may infer, that should exceptions be admitted in other laws of less consequence, yet, however, they ought not in this. Lastly, he may consider the reason alleged by the defendant, on which he founds his plea, and shew there was not that necessity of violating the law in the present case, as is pretended. And this is often the more requisite, because the party who disputes against the words of the law, always endeavours to support his allegations from the equity of the case. If, therefore, this plea can be enervated, the main support of the defendant's cause is removed. For as the former arguments are designed to prevail with the judge, to determine the matter on this side the question from the nature of the case; so the intention of this argument is to induce him to it, from the weakness of the defence made by the opposite party. But the defendant will, on the contrary, use such arguments, as may best demonstrate the equity of his cause, and endeavour to vindicate the fact from his good design and intention in doing it. He will say, That the laws have allotted punishments for the commission of such facts as are evil in themselves, or prejudicial to others; neither of which can be charged upon the action for which he is accused: That no law can be rightly executed, if more regard be had to the words and syllables of the writing, than to the intention of the legislator. To which purpose, he may allege that direction of the law itself, which says, "The law ought not to be too rigorously interpreted, nor the words of it strained; but the true intention and design of each part of it duly considered:" As also that saying of Cicero, "What law may not be weakened and destroyed, if we bend the sense to the words, and do not regard the design and view of the legislator?" Hence he may take occasion to complain of the hardship of such a procedure, that no difference should be made between an audacious and wilful crime, and an honest or necessary action, which might happen to disagree with the letter of the law, though not with the intent of it. And as it was observed before to be of considerable service to the accuser, if he could remove the defendant's plea of equity; so it will be of equal advantage to the defendant, if he can fix upon any words in the law, which may in the least seem to countenance his case, since this will take off the main force of the charge.

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The third controversy of this kind is, when two writings happen to clash with each other, or at least seem to do so. Of this Hermogenes gives the following instance. One law enjoins: "He who continues alone in a ship during a tempest, shall have the property of the ship." Another law says, "A disinherited son shall enjoy no part of his father's estate." Now a son, who had been disinherited by his father, happens to be in his father's ship in a tempest, and continues there alone, when every one else had deserted it. He claims the ship by the former of these laws, and his brother tries his right with him by the latter. In such cases, therefore, it may first be considered, Whether the two laws can be reconciled. And if that cannot be done, then, Which of them appears more equitable. Also, Whether one be positive, and the other negative: because prohibitions are a sort of exceptions to positive injunctions. Or, if one be a general law, and the other more particular, and come nearer to the matter in question. Likewise, Which was last made: since former laws are often abrogated, either wholly or in part, by subsequent laws; or at least were designed to be so. Lastly, it may be observed, Whether one of the laws be not plain and express; and the other more dubious, or has any ambiguity in it. All, or any of which things, that party will not omit to improve for his advantage whose interest is concerned in it.

The fourth controversy is *reasoning*. As when something, not expressly provided for by a law, is inferred by a similitude, or parity of reason, from what is contained in it. Quintilian mentions this instance of it. "There was a law made at Tarentum, to prohibit the exportation of wool, but a certain person exports sheep." In this case, the prosecutor may first compare the thing which occasions the charge, with the words of the law, and shew their agreement, and how unnecessary it was that particular thing should have been expressly mentioned in the law, since it is plainly contained in it, or at least an evident consequence from it. He may then plead, that many things of a like nature are omitted in other laws for the same reason. And, lastly, he may urge the reasonableness and equity of the procedure. The defendant, on the other hand, will endeavour to shew the deficiency of the reasoning, and the difference between the two cases. He will insist upon the plain and express words of the law, and set forth the ill tendency of such inferences and conclusions drawn from similitudes and comparisons, since there is scarce any thing but in some respect may bear a resemblance to another.

The last controversy under this head is *interpretation*, in which the dispute turns upon the true meaning and explication of the law in reference to that particular case. We have the following instance of this in the Pandects: "A man who had two sons, both under age, substitutes Titius as heir to him who should die last, provided both of them died in their minority. They both perish together at sea before they came to age. Here arises a doubt, whether the substitution can take place, or the inheritance devolves to the heir at law." The latter pleads, That as neither of them can be said to have died last, the substitution cannot take place; which was suspended, upon

upon the condition that one died after the other. But to this it may be said, It was the intention of the testator, that if both died in their nonage, Titius should succeed to the inheritance; and therefore it makes no difference whether they died together, or one after the other: and so the law determines it.

2. The second head of external arguments are *Witnesses*. These may either give their evidence, when absent, in writing subscribed with their name; or present, by word of mouth. And what both of them testify, may either be from hearsay; or what they saw themselves, and were present at the time it was done. As the weight of the evidence may be thought greater or less on each of these accounts, either party will make such use of it as he finds for his advantage. The characters of the witnesses are also to be considered; and if any thing be found in their lives or behaviour that is justly exceptionable, to invalidate their evidence, it ought not to be omitted. And how they are affected to the contending parties, or either of them, may deserve consideration; for some allowances may be judged reasonable in case of friendship, or enmity, where there is no room for any other exception. But regard should chiefly be had to what they testify, and how far the cause is affected by it. Cicero is very large upon most of these heads in his defence of Marcus Fonteius, with a design to weaken the evidence of the Gauls against him. And where witnesses are produced on one side only, as orators sometimes attempt to lessen the credit of this kind of proof, by pleading, that witnesses are liable to be corrupted, or biased by some prevailing interest or passion, to which arguments taken from the nature and circumstances of things are not subject; it may be answered on the other hand, that sophistical arguments and false colourings are not exposed to infamy or punishment, whereas witnesses are restrained by shame and penalties, nor would the law require them if they were not necessary.

3. The third and last head of external arguments are *Contracts*; which may be either public or private. By public are meant the transactions between different states, as leagues, alliances, and the like; which depend on the laws of nations, and come more properly under deliberative discourses, to which we shall refer them. Those are called *private*, which relate to lesser bodies or societies of men, and single persons; and may be either written, or verbal. And it is not so much the true meaning and purport of them that is here considered, as their force and obligation. And, as the Roman law declares, 'Nothing can be more agreeable to human faith, than that persons should stand to their agreements.' Therefore, in controversies of this kind, the party, whose interest it is that the contract should be maintained, will plead, that such covenants have the force of private laws, and ought religiously to be observed, since the common affairs of mankind are transacted in that manner; and therefore to violate them, is to destroy all commerce and society among men. On the other side it may be said, that justice and equity are chiefly to be regarded, which are immutable; and besides, that the public laws are the common rule to determine such differences, which are designed to redress those who are aggrieved. And, indeed, where a compact has been obtained by force or fraud, it is in itself void, and

has no effect either in law or reason. But on the other hand, the Roman lawyers seem to have very rightly determined, that all such obligations as are founded in natural equity, though not binding by national laws, and are therefore called *nuda pacta*, ought, however, in honour and conscience to be performed.

III. *Of the State of a Controversy*. The ancients, observing that the principal question or point of dispute in all controversies might be referred to some particular head, reduced those heads to a certain number; that both the nature of the question might by that means be better known, and the arguments suited to it be discovered with greater ease. And these heads they call *states*.

By the state of a controversy, then, we are to understand the principal point in dispute between contending parties, upon the proof of which the whole cause or controversy depends. We find it expressed by several other names in ancient writers: as, the *constitution of the cause*, the *general head*, and the *chief question*. And as this is the principal thing to be attended to in every such discourse; so it is what first requires the consideration of the speaker, and should be well fixed and digested in his mind, before he proceeds to look for arguments proper to support it. Thus Anthony, the Roman orator, speaking of his own method in his pleading, says: "When I understand the nature of the cause, and begin to consider it, the first thing I endeavour to do is, to settle with myself what that is to which all my discourse relating to the matter in dispute ought to be referred: then I diligently attend to these other two things, How to recommend myself, or those for whom I plead, to the good esteem of my hearers; and how to influence their minds, as may best suit my design." This way of proceeding appears very agreeable to reason and prudence. For what can be more absurd, than for a person to attempt the proof of any thing, before he has well settled in his own mind a clear and distinct notion, what the thing is which he would endeavour to prove? Quintilian describes it to be, 'That kind of question which arises from the first conflict of causes.' In judicial cases, it immediately follows upon the charge of the plaintiff, and plea of the defendant. Our common law expresses it by one word, namely, the *issue*. Which interpreters explain, by describing it to be, "That point of matter depending in suit, whereupon the parties join, and put their cause to the trial." Examples will further help to illustrate this, and render it more evident. In the cause of Milo, the charge of the Clodian party is, *Milo killed Clodius*. Milo's plea or defence, *I killed him, but justly*. From hence arises this grand question, or state of the cause: *Whether it was lawful for Milo to kill Clodius?* And that Clodius was lawfully killed by Milo, is what Cicero in his defence of Milo principally endeavours to prove. This is the main subject of that fine and beautiful oration. The whole of his discourse is to be considered as centering at last in this one point. Whatever different matters are occasionally mentioned, will, if closely attended to, be found to have been introduced some way or other the better to support and carry on this design. Now in such cases, where the fact is not denied, but something is offered in its defence, the state of the cause is taken from the defendant's plea, who is obliged to make it good: As in the instance here given,

Invention. the chief point in dispute was the lawfulness of Milo's action, which it was Cicero's business to demonstrate. But when the defendant denies the fact, the state of the cause arises from the accusation; the proof of which then lies upon the plaintiff, and not, as in the former case, upon the defendant. So in the cause of Roscius, the charge made against him is, *That he killed his father.* But he denies the fact. The grand question therefore to be argued is: *Whether or not he killed his father?* The proof of this lay upon his accusers. And Cicero's design in his defence of him is to shew, that they had not made good their charge. But it sometimes happens, that the defendant neither absolutely denies the fact, nor attempts to justify it; but only endeavours to qualify it, by denying that it is a crime of that nature, or deserves that name, by which it is expressed in the charge. We have an example of this proposed by Cicero: "A person is accused of sacrilege, for taking a thing, that was sacred, out of a private house. He owns the fact, but denies it to be sacrilege; since it was committed in a private house, and not in a temple." Hence this question arises: *Whether to take a sacred thing out of a private house, is to be deemed sacrilege, or only simple theft?* It lies upon the accuser to prove what the other denies; and therefore the state of the cause is here also, as well as in the preceding case, taken from the indictment.

But besides the principal question, there are other subordinate questions, which follow upon it in the course of a dispute, and should be carefully distinguished from it. Particularly that which arises from the reason, or argument, which is brought in proof of the principal question. For the principal question itself proves nothing, but is the thing to be proved, and becomes at last the conclusion of the discourse. Thus, in the cause of Milo, his argument is: *I killed Clodius justly, because he assassinated me.* Unless the Clodian party be supposed to deny this, they give up their cause. From hence therefore this subordinate question follows: *Whether Clodius assassinated Milo?* Now Cicero spends much time in the proof of this, as the hinge on which the first question, and consequently the whole cause, depended. For if this was once made to appear, the lawfulness of Milo's killing Clodius, which was the grand question or thing to be proved, might be inferred as an allowed consequence from it. This will be evident, by throwing Milo's argument, as used by Cicero, into the form of a syllogism.

An assassinator is lawfully killed:

Clodius was an assassinator:

Therefore he was lawfully killed by Milo, whom he assassinated.

If the minor proposition of this syllogism was granted, no one would deny the conclusion: for the Roman law allowed of self-defence. But as Cicero was very sensible this would not be admitted, so he takes much pains to bring the court into the belief of it. Now where the argument brought in defence of the second question is contested, or the orator supposes that it may be so, and therefore supports that with another argument, this occasions a third question consequent upon the former; and in like manner he may proceed to a fourth. But be they more or fewer, they are to be considered but as one chain of subordinate questions

dependent upon the first. And though each of them has its particular state, yet none of these is what rhetoricians call *The state of the Cause*, which is to be understood only of the principal question. And if, as it frequently happens, the first or principal question is itself directly proved from more than one argument; this makes no other difference, but that each of these arguments, so far as they are followed by others to support them, become a distinct series of subordinate questions, all dependent upon the first. As when Cicero endeavours to prove, that Roscius did not kill his father, from two reasons or arguments: *Because he had neither any cause to move him to such a barbarous action, nor any opportunity for it.*

Moreover, besides these subordinate questions, there are also incidental ones often introduced, which have some reference to the principal question, and contribute towards the proof it, though they are not necessarily connected with it, or dependent upon it. And each of these also has its state, though different from that of the cause. For every question, or point of controversy, must be stated, before it can be made the subject of disputation. And it is for this reason, that every new argument advanced by an orator is called a *question*; because it is considered as a fresh matter of controversy. In Cicero's defence of Milo, we meet with several of this sort of questions, occasioned by some aspersions which had been thrown out by the Clodian party to the prejudice of Milo. As, "That he was unworthy to see the light, who owned he had killed a man?" For Milo before his trial had openly confessed he killed Clodius. So likewise, "That the senate had declared the killing of Clodius was an illegal action." And further, "That Pompey, by making a new law to settle the manner of Milo's trial, had given his judgment against Milo." Now to each of these Cicero replies, before he proceeds to the principal question. And therefore, though the question, in which the state of a controversy consists, is said by Quintilian to arise from "the first conflict of causes," yet we find by this instance of Cicero, that it is not always the first question in order, upon which the orator treats.

But it sometimes happens, that the same cause or controversy contains in it more than one state. Thus in judicial causes, every distinct charge occasions a new state. All Cicero's orations against Verres relate to one cause, founded upon a law of the Romans against unjust exactions made by their governors of provinces upon the inhabitants; but as that prosecution is made up of as many charges as there are orations, every charge, or indictment, has its different state. So likewise his oration in defence of Cælius has two states, in answer to a double charge made against him by his adversaries: one, "for borrowing money of Clodia, in order to bribe certain slaves to kill a foreign ambassador;" and the other, "for an attempt afterward to poison Clodia herself." Besides which, there were several other matters of a less heinous nature, which had been thrown upon him by his accusers, with a design, very likely, to render the two principal charges more credible; to which Cicero first replies, in the same manner as in his defence of Milo.

Though all the examples we have hitherto brought to illustrate this subject, have been taken from judicial cases;

causes; yet not only these, but very frequently discourses of the deliberative kind, and sometimes those of the demonstrative, are managed in a controversial way. And all controversies have their state. And therefore Quintilian very justly observes, that "states belong both to general and particular questions; and to all sorts of causes, demonstrative, deliberative, and judicial." In Cicero's oration for the Manilian law, this is the main point in dispute between him, and those who opposed that law: "Whether Pompey was the fittest person to be intrusted with the management of the war against Mithridates?" This is a subject of the deliberative kind. And of the same nature was that debate in the senate, concerning the demolition of Carthage. For the matter in dispute between Cato, who argued for it, and those who were of the contrary opinion, seems to have been this: "Whether it was for the interest of the Romans to demolish Carthage?" And so likewise in those two fine orations of Cato and Cæsar, given us by Sallust, relating to the conspirators with Catiline, who were then in custody, the controversy turns upon this: "Whether those prisoners should be punished with death, or perpetual imprisonment?" Examples of the demonstrative kind are not so common; but Cicero's oration concerning the 'Answerers of the soothsayers,' may afford us an instance of it. Several prodigies had lately happened at Rome, upon which the soothsayers being consulted, assigned this as the reason of them, Because some places consecrated to the gods had been afterwards converted to civil uses. Clodius charged this upon Cicero; whose house was rebuilt at the public expence, after it had been demolished by Clodius, and the ground consecrated to the goddess Liberty. Cicero in this oration retorts the charge; and shews, that the prodigies did not respect him, but Clodius. So that the question in dispute was: "To which of the two those prodigies related?" This oration does not appear to have been spoken in a judicial way, and must therefore belong to the demonstrative kind. His invective against Piso is likewise much of the same nature, wherein he compares his own behaviour and conduct with that of Piso.

As to the number of these states, both Cicero and Quintilian reduce them to three. "We must (says Quintilian) agree with those, whose authority Cicero follows, who tell us, that three things may be inquired into in all disputes: Whether a thing is; what it is; and how it is. And this is the method which nature prescribes. For in the first place, it is necessary the thing should exist, about which the dispute is: because no judgment can be made either of its nature, or quality, till its existence be manifest; which is therefore the first question. But though it be manifest that a thing is, it does not presently appear what it is; and when this is known, the quality yet remains: and after these three are settled, no further inquiry is necessary." Now the first of these three states is called the *conjectural state*; as if it be inquired, "Whether one person killed another?" This always follows upon the denial of a fact, by one of the parties; as was the case of Roscius. And it receives its name from hence, that the fact is left, as it were, to conjecture, whether the judge was really committed or not, from the evidence produced on the other side. The second is call-

ed the *definitive state*, when the fact is not denied; but the dispute turns upon the nature of it, and what name is proper to give it: as in that example of Cicero, "Whether to take a sacred thing out of a private house be theft, or sacrilege?" For in this case it is necessary to settle the distinct notion of those two crimes, and shew their difference. The third is called the *state of quality*; when the contending parties are agreed both as to the fact, and the nature of it; but the dispute is, "Whether it be just or unjust, profitable or unprofitable, and the like;" as in the cause of Milo.

From what has been said upon this subject, the use of it may in a good measure appear. For whoever engages in a controversy, ought in the first place to consider with himself the main question in dispute, to fix it well in his mind, and keep it constantly in his view; without which he will be very liable to ramble from the point, and bewilder both himself and his hearers. And it is no less the business of the hearers principally to attend to this; by which means they will be helped to distinguish and separate from the principal question what is only incidental, and to observe how far the principal question is affected by it; to perceive what is offered in proof, and what is only brought in for illustration; not to be misled by digressions, but to discern when the speaker goes off from his subject, and when he returns to it again; and, in a word, to accompany him through the whole discourse, and carry with them the principal chain of reasoning upon which the cause depends, so as to judge upon the whole, whether he has made out his point, and the conclusion follows from the premises.

CHAP. II. Of Arguments suited to Demonstrative Discourses.

THESE consist either in praise or dispraise; and, agreeably to the nature of all contraries, one of them will serve to illustrate the other.

Now we either praise *persons* or *things*.

I. In praising or dispraising *persons*, rhetoricians prescribe two methods. One is, to follow the order in which every thing happened that is mentioned in the discourse; the other is, to reduce what is said under certain general heads, without a strict regard to the order of time.

1. In pursuing the former method, the discourse may be very conveniently divided into three periods. The first of which will contain what preceded the person's birth; the second, the whole course of his life; and the third, what followed upon his death.

Under the first of these may be comprehended what is proper to be said concerning his country or family. And therefore, if these were honourable, it may be said to his advantage, that he noways disgraced them, but acted suitably to such a descent. But if they were not so, they may be either wholly omitted: or it may be said, that, instead of deriving thence any advantage to his character, he has conferred a lasting honour upon them; and that it is not of so much moment where, or from whom, a person derives his birth, as how he lives.

In the second period, which is that of his life, the qualities both of his mind and body, with his circumstances in the world, may be separately considered. Though, as Quintilian rightly observes: "All external

nal advantages are not praises for themselves, but according to the use that is made of them. For riches, and power, and interest, as they have great influence, and may be applied either to good or bad purposes, are a proof of the temper of our minds; and therefore we are either made better or worse by them." But these things are a just ground for commendation, when they are the reward of virtue, or industry. Bodily endowments are health, strength, beauty, activity, and the like; which are more or less commendable, according as they are employed. And where these, or any of them, are wanting, it may be shewn, that they are abundantly compensated by the more valuable endowments of the mind. Nay, sometimes a defect in these may give an advantageous turn to a person's character; for any virtue appears greater, in proportion to the disadvantages the person laboured under in exerting it. But the chief topics of praise are taken from the virtues and qualifications of the mind. And here the orator may consider the disposition, education, learning, and several virtues, which shone through the whole course of the person's life. In doing which, the preference should always be given to virtue above knowledge or any other accomplishment. And in actions, those are most considerable, and will be heard with greatest approbation, which a person either did alone, or first, or wherein he had fewest associates; as likewise those which exceeded expectation, or were done for the advantage of others rather than his own. And further, as the last scene of a man's life generally commands the greatest regard, if any thing remarkable at that time was either said or done, it ought particularly to be mentioned. Nor should the manner of his death, or cause of it, if accompanied with any commendable circumstances, be omitted; as if he died in the service of his country, or in the pursuit of any other laudable design.

The third and last period relates to what followed after the death of the person. And here the public loss, and public honours conferred upon the deceased, are proper to be mentioned. Sepulchres, statues, and other monuments to perpetuate the memory of the dead, at the expence of the public, were in common use both among the Greeks and Romans. But in the earliest times, as these honours were more rare, so they were less costly. For as in one age it was thought a sufficient reward for him who died in the defence of his country, to have his name cut in a marble inscription, with the cause of his death; so, in others, it was very common to see the statues of gladiators, and persons of the meanest rank, erected in public places. And therefore a judgment is to be formed of these things from the time, custom, and circumstances, of different nations; since the frequency of them renders them less honourable, and takes off from their evidence as the rewards of virtue. But, as Quintilian says, "Children are an honour to their parents, cities to their founders, laws to those who compiled them, arts to their inventors, and useful customs to the authors of them."

And this may suffice for the method of praising persons, when we propose to follow the order of time, as Isocrates has done in his funeral oration upon Evagoras king of Salamis, and Pliny in his panegyric upon the emperor Trajan. But as this method is

very plain and obvious, so it requires the more agreeable dress to render it delightful; left otherwise it seem rather like an history, than an oration: For which reason, we find, that epic poets, as Homer, Virgil, and others, begin with the middle of their story, and afterwards take a proper occasion to introduce what preceded, to diversify the subject, and give the greater pleasure and entertainment to their readers.

2. The other method above hinted was, to reduce the discourse to certain general heads, without regarding the order of time. As if any one, in praising the elder Cato, should propose to do it, by shewing, that he was a most prudent senator, an excellent orator, and most valiant general; all which commendations are given him by Pliny. In like manner, the character of a good general may be comprised under four heads; skill in military affairs, courage, authority, and success: from all which Cicero commends Pompey. And agreeably to this method Suetonius has written the lives of the first twelve Cæsars.

But in praising of persons, care should always be taken, to say nothing that may seem fictitious, or out of character, which may call the orator's judgment or integrity in question. It was not without cause, therefore, that Lyfippus the statuary, as Plutarch tells us, blamed Apelles for painting Alexander the Great with thunder in his hand; which could never suit his character as a man, however he might boast of his divine descent: for which reason Lyfippus himself made an image of him holding a spear, as the sign of a warrior. Light and trivial things in commendations are likewise to be avoided, and nothing mentioned but what may carry in it the idea of something truly valuable, and which the hearers may be supposed to wish for, and is proper to excite their emulation. These are the principal heads of praise with relation to men. In dispraise, the heads contrary to these are requisite; which being sufficiently clear from what has been said, need not particularly be insisted on.

II. We proceed therefore to the other part of the division, which respects *things*, as distinguished from persons. By which we are to understand all beings inferior to man, whether animate or inanimate; as likewise the habits and dispositions of men, either good or bad; when considered separately, and apart from their subjects, as arts and sciences, virtues and vices, with whatever else may be a proper subject for praise or dispraise. Some writers, indeed, have, for their own amusement and the diversion of others, displayed their eloquence in a jocular manner upon subjects of this kind. So Lucian has written in praise of a fly, and Synesius an elegant encomium upon baldness. Others, on the contrary, have done the like in a satirical way. Such is Seneca's apotheosis or consecration of the emperor Claudius; and the Mysopogon or beard-hater, written by Julian the emperor. Not to mention several modern authors, who have imitated them in such ludicrous compositions. But as to these things, and all of the like nature, the observation of Antony in Cicero seems very just: "That it is not necessary to reduce every subject we discourse upon to rules of art." For many are so trivial, as not to deserve it; and others so plain and evident of themselves, as not to require it. But since it frequently comes in the

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Countries, then, may be celebrated from the pleasantries of their situation, the clemency and wholesomeness of the air, and goodness of the soil; to which last may be referred the springs, rivers, woods, plains, mountains, and minerals. And to all these may be added their extent, cities, the number and antiquity of the inhabitants; their policy, laws, customs, wealth, character for cultivating the arts both of peace and war; their princes, and other eminent men they have produced. Thus Pacatus has given us a very elegant description of Spain, in his panegyric upon the emperor Theodosius, who was born there.

Cities are praised from much the same topics, as countries. And here, whatever contributes either to their defence, or ornament, ought particularly to be mentioned; as the strength of the walls and fortifications, the beauty and splendour of the buildings, whether sacred or civil, public or private. We have in Herodotus a very fine description of Babylon, which was once the strongest, largest, and most regular city in the world. And Cicero has accurately described the city of Syracuse, in the island Sicily, in one of his orations against Verres.

But facts come much oftener under the cognizance of an orator. And these receive their commendation from their honour, justice, or advantage. But in describing them, all the circumstances should be related in their proper order; and that in the most lively and affecting manner, suited to their different nature. Livy has represented the demolition of Alba by the Roman army, which was sent thither to destroy it, through the whole course of that melancholy scene, in a style so moving and pathetic, that one can hardly forbear condoling with the inhabitants, upon reading his account.

But in discourses of this kind, whether of praise or dispraise, the orator should (as he ought indeed upon all occasions) well consider where, and to whom, he speaks. For the wise men often think very differently both of persons and things from the common people. And we find that learned and judicious men are frequently divided in their sentiments, from the several ways of thinking to which they have been accustomed. Besides, different opinions prevail, and gain the ascendant, at different times. While the Romans continued a free nation, love of their country, liberty, and public spirit, were principles in the highest esteem among them. And therefore, when Cato killed himself, that he might not fall into the hands of Cæsar, and sur vive the liberty of his country, it was thought an instance of the greatest heroic virtue; but afterwards, when they had been accustomed to an arbitrary government, and the spirit of liberty was now lost, the poet Martial could venture to say,

Death to avoid 'tis madners sure to die.

A prudent orator therefore will be cautious of opposing any settled and prevailing notions of those to whom he addresses; unless it be necessary, and then he will do it in the softest and most gentle manner.

CHAP. III. *Of Arguments suited to Deliberative Discourses.*

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THIS kind of discourses must certainly have been very ancient; since, doubtless, from the first beginning of mens conversing together, they deliberated upon their common interest, and offered their advice to each other. But neither those of the laudatory nor judicial kind could have been introduced, till mankind were settled in communities, and found it necessary to encourage virtue by public rewards, and bring vice under the restraint of laws. The early practice of suafory discourses appears from sacred writ, where we find, that when Moses was ordered upon an embassy into Egypt, he would have excused himself for want of eloquence. And Homer represents the Greeks at the siege of Troy, as flocking like a swarm of bees to hear their generals harangue them. Nor is this part of oratory less conspicuous for its usefulness to mankind, than its antiquity; being highly beneficial either in councils, camps, or any societies of men. How many instances have we upon record, where the fury of an enraged multitude has been checked and appealed by the prudent and artful persuasion of some particular person? The story of Agrippa Menenius, when the commons of Rome withdrew from the senators, and retired out of the city, is too well known, to need reciting. And how often have armies been animated and fired to the most dangerous exploits, or recalled to their duty, when ready to mutiny, by a moving speech of their general? many instances of which we find in history.

All deliberation respects something future, for it is in vain to consult about what is already past. The subject-matter of it is, either things public or private, sacred or civil; indeed all the valuable concerns of mankind, both present and future, come under its regard. And the end proposed by this kind of discourses is chiefly profit or interest. But since nothing is truly profitable, but what is in some respect good; and every thing, which is good in itself, may not in all circumstances be for our advantage; properly speaking, what is both good and profitable, or beneficial good, is the end here designed. And therefore, as it sometimes happens, that what appears profitable, may seem to interfere with that which is strictly just and honourable; in such cases it is certainly most advisable to determine on the safer side of honour and justice, notwithstanding some plausible things may be offered to the contrary. But where the dispute lies apparently between what is truly honest, and some external advantage proposed in opposition to it, all good men cannot but agree in favour of honesty. Such was the case of Regulus, who, being taken prisoner by the Carthaginians, was permitted to go to Rome upon giving his oath, that unless he could persuade the senate to set at liberty some young Carthaginian noblemen, then prisoners at Rome, in exchange for him, he should return again to Carthage. But Regulus, when he came to Rome, was so far from endeavouring to prevail with the senate to comply with the desire of the Carthaginians, that he used all his interest to dissuade them from hearkening to the proposal. Nor could the most earnest intreaties of his

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1. *Pleasure* often affords a very cogent argument in discourses of this nature. Every one knows what an influence this has upon the generality of mankind. Though, as Quintilian remarks, pleasure ought not of itself to be proposed as a fit motive for action in serious discourses, but when it is designed to recommend something useful, which is the case here. So, would any one advise another to the pursuit of polite literature, Cicero has furnished him with a very strong inducement to it from the pleasure which attends that study, when he says: "If pleasure only was proposed by these studies, you would think them an entertainment becoming a man of sense and a gentleman. For other pursuits neither agree with all times, all ages, nor all places; but these studies improve youth, delight old age, adorn prosperity, afford a refuge and comfort in adversity, divert us at home, are no hindrance abroad, sleep, travel, and retire with us into the country."

2. *Profit*, or advantage. This has no less influence upon many persons than the former; and when it respects things truly valuable, it is a very just and laudable motive. Thus Cicero, when he sends his *Books of offices* to his son, which he wrote in Latin for his use, advises him to make the best advantage both of his tutor's instructions, and the conversation at Athens, where he then was; but withal to peruse his philosophical treatises, which would be doubly useful to him, not only upon account of the subjects, but likewise of the language, as they would enable him to express himself upon those arguments in Latin, which before had only been treated of in Greek.

3. *Honour*; than which no argument will sooner prevail with generous minds, or inspire them with greater ardour. Virgil has very beautifully described Hector's ghost appearing to Æneas the night Troy was taken, and advising him to depart from this motive of honour:

O goddess! born, escape by timely flight
The flames, and horrors of this fatal night.

The foes already have possess'd the wall,
Troy nods from high, and totters to her fall.
Enough is paid to Priam's royal name;
More than enough to duty, and to fame.
If by a mortal hand my father's throne
Could be defended, 'twas by mine alone.

The argument here made use of to persuade Æneas to leave Troy immediately, is, that he had done all that could be expected from him, either as a good subject or brave soldier, both for his king and country; which were sufficient to secure his honour: and now there was nothing more to be expected from him, when the city was falling, and impossible to be saved; which could it have been preserved by human power, he himself had done it.

But although a thing considered in itself appear beneficial if it could be attained, yet the expediency of undertaking it may still be questionable; in which case the following heads taken from the circumstances which attend it, will afford proper arguments to engage in it.

(1.) The *possibility* of succeeding may sometimes be argued, as one motive to this end. So Hannibal endeavoured to convince king Antiochus, that it was possible for him to conquer the Romans, if he made Italy the seat of the war; by observing to him, not only that the Gauls had formerly destroyed their city; but that he had himself defeated them, in every battle he fought with them in that country.

(2.) But an argument founded upon *probability* will be much more likely to prevail. For in many affairs of human life, men are determined either to prosecute them or not, as the prospect of success appears more or less probable. Hence Cicero, after the fatal battle at Pharsalia, dissuades those of Pompey's party, with whom he was engaged, from continuing the war any longer against Cæsar; because it was highly improbable, after such a defeat, by which their main strength was broken, that they should be able to stand their ground, or meet with better success than they had before.

(3.) But further, since probability is not a motive strong enough with many persons to engage in the prosecution of a thing which is attended with considerable difficulties, it is often necessary to represent the facility of doing it, as a further reason to induce them to it. And therefore Cicero makes use of this argument to encourage the Roman citizens in opposing Mark Anthony (who upon the death of Cæsar had assumed an arbitrary power), by representing to them, that his circumstances were then desperate, and that he might easily be vanquished.

(4.) Again, if the thing advised can be shewn to be in any respect necessary, this will render the motive still much stronger for undertaking it. And therefore Cicero joins this argument with the former, to prevail with the Roman citizens to oppose Anthony, by telling them, that "The consideration before them was, not in what circumstances they should live; but whether they should live at all, or die with ignominy and disgrace." This way of reasoning will sometimes prevail when all others prove ineffectual. For some persons are not to be moved, till things are brought to an extremity, and they find themselves reduced to the utmost danger.

(5.) To these heads may be added the consideration

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These are the principal heads which furnish the orator with proper arguments in giving advice. Cicero, in his oration for the Manilian law, where he endeavours to persuade the Roman people to choose Pompey for their general in the Mithridatic war, reasons from three of these topics, into which he divides his whole discourse; namely, the necessity of the war, the greatness of it, and the choice of a proper general. Under the first of these he shews, that the war was necessary from four considerations; the honour of the Roman state, the safety of their allies, their own revenues, and the fortunes of many of their fellow citizens, which were all highly concerned in it, and called upon them to put a stop to the growing power of king Mithridates, by which they were all greatly endangered. So that this argument is taken from the head of *necessity*. The second, in which he treats of the greatness of the war, is founded upon the topic of *possibility*. For though he shews the power of Mithridates to be very great, yet not so formidable, but that he might be subdued; as was evident from the many advantages Lucullus had gained over him and his associates. In the third head, he endeavours to prevail with them to intrust the management of the war in the hands of Pompey, whom he describes as a consummate general, for his skill in military affairs, courage, authority, and success; in all which qualities he represents him as superior to any other of their generals whom they could at that time make choice of. The design of all which was, to persuade them, that they had very good reason to hope for success, and a happy event of the war, under his conduct. So that the whole force of his reasoning under this head is drawn from *probability*. These are the three general topics which make up that fine discourse. Each of which is indeed supported by divers other arguments and considerations, which will be obvious in perusing the oration itself, and therefore need not be here enumerated. On the contrary, in another oration he endeavours to dissuade the senate from consenting to a peace with Mark Anthony, because it was base, dangerous, and impracticable.

But no small skill and address are required in giving advice. For since the tempers and sentiments of mankind, as well as their circumstances, are very different and various; it is often necessary to accommodate the discourse to their inclinations and opinions of things. And therefore the weightiest arguments are not always the most proper, and fittest to be used on all occasions. Cicero, who was an admirable master of this art, and knew perfectly well how to suit what he said to the taste and relish of his hearers, in treating upon

this subject, distinguishes mankind into two sorts; the ignorant and unpolished, who always prefer profit to honour; and such as are more civilized and polite, who prefer honour and reputation to all other things. Wherefore they are to be moved by these different views: Praise, glory, and virtue, influence the one; while the other is only to be engaged by a prospect of gain and pleasure. Besides, it is plain, that the generality are much more inclined to avoid evils than to pursue what is good; and to keep clear of scandal and disgrace, than to practise what is truly generous and noble. Persons likewise of a different age act from different principles; young men for the most part view things in another light, from those who are older, and have had more experience, and consequently are not to be influenced by the same motives.

CHAP. IV. Of Arguments suited to Judicial Discourses.

In *judicial* controversies there are two parties; the plaintiff or prosecutor, and the defendant or person charged. The subject of them is always something past. And the end propoed by them Cicero calls *equity*, or *right and equity*; the former of which arises from the laws of the country, and the latter from reason and the nature of things. For at Rome the prætors had a court of equity, and were empowered, in many cases relating to property, to relax the rigour of the written laws. But as this subject is very copious, and causes may arise from a great variety of things, writers have reduced them to three heads, which they call *states*, to some one of which all judicial proceedings may be referred; namely, *whether a thing is, what it is, or how it is*. By the *state* of a cause therefore is meant the principal question in dispute, upon which the whole affair depends. Which, if it stops in the first inquiry, and the defendant denies the fact, the state is called *conjectural*; but if the fact be acknowledged, and yet denied to be what the adversary calls it, it is termed *definitive*; but if there is no dispute either about the fact or its name, but only the justice of it, it is called the *state of quality*: as was shewn more largely before under n^o 20. But we there considered these states only in a general view, and deferred the particular heads of argument proper for each of them, to this *judicial* kind of discourses; where they most frequently occur, and from which examples may easily be accommodated to other subjects.

All judicial causes are either *private* or *public*. Those are called *private*, which relate to the right of particular persons; and they are likewise called *civil* causes, as they are conversant about matters of property. *Public* causes are those which relate to public justice and the government of the state; which are also called *criminal*, because by them crimes are prosecuted, whether capital, or those of a less heinous nature. We shall take the heads of the arguments only from this latter kind, because they are more copious, and easy to be illustrated by examples; from which such as agree to the former, namely *civil* causes, will sufficiently appear.

1. The *conjectural* state. When the accused person denies the fact, there are three things which the prosecutor has to consider; whether he *would* have done it, whether he *could*, and whether he *did* it. And

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hence arise three topics; from the *will*, the *power*, and the *signs* or circumstances which attended the action. The affections of the mind discover the will; as, passion, an old grudge, a desire of revenge, a resentment of an injury, and the like. Therefore Cicero argues from Clodius's hatred of Milo, that he designed his death; and from thence infers, that he was the aggressor in the combat between them, wherein Clodius was killed. This is what he principally endeavours to prove, and comes properly under this state: for Milo owned that he killed him, but alleged that he did it in his own defence. So that in regard to this point, Which of them assaulted the other, the charge was mutual. The prospect of advantage may also be alleged to the same purpose. Hence it is said of L. Cassius, that whenever he sat as judge in a case of murder, he used to advise and move the court, to examine, to whom the advantage arose from the death of the deceased. And Cicero puts this to Anthony concerning the death of Cæsar. "If any one (says he) should bring you upon trial, and use that saying of Cælius, *Cui bono*? 'Who got by it?' look to it, I beseech you, that you are not confounded." To these arguments may be added, hope of impunity, taken either from the circumstances of the accused person, or of him who suffered the injury. For persons, who have the advantage of interest, friends, power, or money, are apt to think they may easily escape; as likewise such, who have formerly committed other crimes with impunity. Thus Cicero represents Clodius as hardened in vice, and above all the restraint of laws, from having so often escaped punishment upon committing the highest crimes. On the contrary, such a confidence is sometimes raised from the condition of the injured party, if he is indigent, obscure, timorous, or destitute of friends; much more if he has an ill reputation, or is loaded with popular hatred and resentment. It was this presumption of the obscurity of Roscius, who lived in the country, and his want of interest at Rome, which encouraged his accusers to charge him with killing his father, as Cicero shews in his defence of him. Lastly, the temper of a person, his views, and manner of life, are considerations of great moment in this matter. For persons of bad morals, and such as are addicted to vice, are easily thought capable of committing any wickedness. Hence Sallust argues from the evil disposition and vicious life of Catiline, that he affected to raise himself upon the ruins of his country. The second head is the *power* of doing a thing: and there are three things which relate to this, the *place*, the *time*, and *opportunity*. As if a crime is said to have been committed in a private place, where no other person was present; or in the night; or when the injured person was unable to provide for his defence. Under this head, may likewise be brought in the circumstances of the persons; as if the accused person was stronger, and so able to overpower the other; or more active, and so could easily make his escape. Cicero makes great use of this topic in the case of Milo, and shews, that Clodius had all the advantages of *place*, *time*, and *opportunity*, to execute his design of killing him. The third head comprehends the *signs* and circumstances, which either preceded, accompanied, or followed, the commission of the fact. So threats, or the accused person being seen at or near the

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place before the fact was committed, are circumstances that may probably precede murder; fighting, crying out, bloodshed, are such as accompany it; paleness, trembling, inconsistent answers, hesitation, or faltering of the speech, something found upon the person accused which belonged to the deceased, are such as follow it. Thus Cicero proves, that Clodius had threatened the death of Milo, and given out that he should not live above three days at the farthest. These arguments, taken from conjectures, are called *presumptions*, which, though they do not directly prove that the accused person committed the fact with which he is charged; yet when, laid together, they appeared very strong, sentence by the Roman law might sometimes be given upon them, to convict him.

These are the topics from which the prosecutor takes his arguments. Now the business of the defendant is to invalidate these. Therefore such as are brought from the *will*, he either endeavours to shew are not true, or so weak as to merit very little regard. And he refutes those taken from the *power*, by proving that he wanted either opportunity or ability: as, if he can shew, that neither the place nor time insisted on was at all proper; or that he was then in another place. In like manner he will endeavour to confute the *circumstances*, if they cannot be directly denied, by shewing that they are not such as do necessarily accompany the fact, but might have proceeded from other causes, though nothing of what is alleged had been committed; and it will be of great service to assign some other probable cause. But sometimes the defendant does not only deny that he did the fact, but charges it upon another. Thus Cicero, in his oration for Roscius, not only defends him from each of these three heads, but likewise charges the fact upon his accusers.

2. The *definitive* state, which is principally concerned in defining and fixing the name proper to the fact: though orators seldom make use of exact definitions, but commonly choose larger descriptions, taken from various properties of the subject or thing described.

The heads of argument in this state are much the same to both parties. For each of them defines the fact his own way, and endeavours to refute the other's definition. We may illustrate this by an example from Quintilian: "A person is accused of sacrilege, for stealing money out of a temple, which belonged to a private person." The fact is owned; but the question is, *Whether it be properly sacrilege?* The prosecutor calls it so, because it was taken out of a temple. But since the money belonged to a private person, the defendant denies it to be sacrilege, and says it is only simple theft. Now the reason why the defendant uses this plea, and insists upon the distinction, is, because by the Roman law the penalty of theft was only four times the value of what was stolen; whereas sacrilege was punished with death. The prosecutor then forms his definition agreeable to his charge, and says, "To steal any thing out of a sacred place is sacrilege." But the defendant excepts against this definition, as defective; and urges, that it does not amount to sacrilege, unless the thing stolen was likewise sacred. And this case might once, perhaps, have been a matter of controversy, since we find it expressly

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The second thing is the proof brought by each party each party to support his definition; as in the example given us by Cicero, of one "who carried his cause by bribery, and was afterwards prosecuted again upon an action of prevarication." Now, if the defendant was cast upon this action, he was, by the Roman law, subjected to the penalty of the former prosecution. Here the prosecutor defines prevarication to be, *Any bribery or corruption in the defendant, with a design to pervert justice.* The defendant therefore, on the other hand, restrains it to *bribing only the prosecutor.*

And if this latter sense agrees better with the common acceptance of the word, the prosecutor in the third place pleads the intention of the law, which was to comprehend all bribery in judicial matters under the term of *prevarication*. In answer to which the defendant endeavours to shew, either from the head of contraries, that a real prosecutor and a prevaricator are used as opposite terms in the law; or from the etymology of the word, that a prevaricator denotes one who pretends to appear in the prosecution of a cause, while in reality he favours the contrary side; and consequently, that money given for this end, only can, in the sense of the law, be called *prevarication*.

Lastly, the prosecutor pleads, that it is unreasonable, that he who does not deny the fact, should escape by a cavil about a word. But the defendant insists upon his explication as agreeable to the law; and says, the fact is misrepresented and blackened, by affixing to it a wrong name.

3. The third state is that of *quality*, in which the dispute turns upon the justice of an action. And here the defendant does not deny he did the thing he is charged with; but asserts it to be right and equitable, from the circumstances of the case, and the motives which induced him to it.

And, first, he sometimes alleges, the reason of doing it was in order to prevent some other thing of worse consequence, which would otherwise have happened. We have an instance of this in the life of Epaminondas, who, with two other generals joined in the command with him, marched the Theban army into Peloponnesus against the Lacedemonians; but by the influence of a contrary faction at home, their commissions were superseded, and other generals sent to command the army. But Epaminondas, being sensible that, if he obeyed this order at that time, it would be attended with the loss of the whole army, and consequently the ruin of the state, refused to do it; and having persuaded the other generals to do the like, they happily finished the war in which they were engaged; and upon their return home, Epaminondas taking the whole matter upon himself, on his trial was acquitted. The arguments proper in this case are taken from the justice, usefulness, or necessity, of the action. The accuser therefore will plead, that the fact was not just, profitable, nor necessary, considered either in itself, or comparatively with that for the sake of which it is said to have been done: and he

will endeavour to shew, that what the defendant assigns for the reason of what he did, might not have happened as he pretends. Besides, he will represent of what ill consequence it must be, if such crimes go unpunished. The defendant, on the other hand, will argue from the same heads, and endeavour to prove the fact was just, useful, or necessary. And he will further urge, that no just estimate can be made of any action, but from the circumstances which attend it; as the design, occasion, and motives for doing it: which he will represent in the most favourable light to his own cause, and endeavour to fet them in such a view, as to induce others to think they could not but have done the same in the like circumstances.

Again, the cause of an action is sometimes charged by the defendant upon the party who received the damage, or some other person, who either made it necessary, or enjoined him to do it. The first of these was Milo's plea for killing Clodius, because he assaulted him with a design to take away his life. Here the fact is not denied, as in the case of Roscius above-mentioned, under the *conjectural* state; but justified from the reason of doing it. For that an assassin might be justly killed, Cicero shews both from law and reason. The accuser, therefore, in such a case, will, if there be room for it, deny the truth of this allegation. So the friends of Clodius affirmed that Milo was the aggressor, and not Clodius; which Cicero, in his defence of Milo, principally labours to refute. In the second case, the prosecutor will say, No one ought to offend because another has offended first; which defeats the course of public justice, renders the laws useless, and destroys the authority of the magistrate. The defendant, on the other hand, will endeavour to represent the danger and necessity of the case, which required an immediate remedy, and in that manner; and urges, that it was vain and impracticable to wait for redress in the ordinary way, and therefore no ill consequence can arise to the public. Thus Cicero, in defending Sextius, who was prosecuted for a riot in bringing armed men into the forum, shews that his design was only to repel force with force; which was then necessary, there being no other means left for the people to assemble, who were excluded by a mob of the contrary party. Of the third case we have also an example in Cicero, who tells us, that, "in making a league between the Romans and Samnites, a certain young nobleman was ordered by the Roman general to hold the swine (designed for a sacrifice); but the senate afterwards disapproving the terms, and delivering up their general to the Samnites, it was moved, Whether this young man ought not likewise to be given up." Those who were for it might say, that, to allege the command of another, is not a sufficient plea for doing an ill action; and this is what the Roman law now expressly declares. But in answer to that, it might be replied, that it was his duty to obey the command of his general, who was answerable for his own orders, and not those who were obliged to execute them; and therefore, to give up this young nobleman would be to punish one person for the fault of another.

Lastly, a fact is sometimes rather excused than defended, by pleading that it was not done designedly,

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or with any ill intent. This is called *concession*; and consists of two parts, *apology* and *intreaty*. The former represents the matter as the effect of inadvertency, chance, or necessity. Aristotle gives us an example of inadvertency or imprudence in a woman at Athens, who gave a young man a love-potion, which killed him; for which she was tried, but acquitted: though afterwards this was made criminal by the Roman law. The case of Adrastus, as related by Herodotus, is an instance of chance; who being intrusted by Croesus with the care of his son, as they were hunting, killed him accidentally with a javelin which he threw at a boar. It is necessity, when a person excuses his making a default, from stresses of weather, sickness, or the like. Thus Cicero pleaded his illness, contracted by the fatigue of a long journey, as an excuse for not appearing in the senate upon the summons of Mark Antony, who threatened to oblige him to it by pulling his house down. But what the defendant here attributes to inadvertency, chance, or necessity, the opposite party will attribute to design, negligence, or some other culpable reason; and represent it as a matter injurious to the public to introduce such precedents; and also produce instances, if that can be done, where the like excuses have not been admitted. On the other hand, the defendant will insist on his innocence, and shew the hardship and severity of judging mens actions rather by the event, than from the intention: that such a procedure makes no difference between the innocent and the guilty; but must necessarily involve many honest men in ruin and destruction, discourage all virtuous and generous designs, and turn greatly to the prejudice of human society. He will also consider the instances alleged by the accuser, and shew the difference between them and his own case. And, lastly, he will have recourse to intreaty, or a submissive address to the equity and clemency of the court, or party offended, for pardon; as Cicero has done in his oration to Cæsar, in favour of Ligarius.

CHAP. V. Of the Character and Address of an Orator.

24

HAVING considered and explained the first part of invention, which furnishes the orator with such arguments as are necessary for the proof of his subject, we are next to shew what are the proper means to conciliate the minds of his hearers; to gain their affection; and to recommend both himself, and what he says, to their good opinion and esteem. For the parts of invention are commonly thus distinguished; that the first respects the *subject* of the discourse, the second the *speaker*, and the third the *hearers*. Now the second of these, what we have at present to explain, is by Quintilian called a *propriety of manners*. And in order to express this, it is necessary, as he tells us, "that every thing appear easy and natural, and the disposition of the speaker be discovered by his words." We may form an easy conception of this from the conduct of such persons who are most nearly concerned in each others welfare. As when relations or friends converse together upon any affairs of importance, the temper and disposition of the speaker plainly shews itself by his words and manner of address. And what nature here directs to without colouring or disguise, the ora-

tor is to endeavour to perform by his art. Though indeed, if what a person says, be inconsistent with his usual conduct and behaviour at other times; he cannot expect it should gain much credit, or make any deep impression upon his hearers: which may be one reason, why the ancient rhetoricians make it so necessary a qualification in an orator, that he be a good man; since he should always be consistent with himself, and, as we say, talk in character. And therefore it is highly requisite, that he should not only gain the skill of assuming those qualities which the nature and circumstances of his discourse require him to express; but likewise, that he should use his utmost endeavours to get the real habits implanted in his mind. For as by this means they will be always expressed with greater ease and facility; so, by appearing constantly in the course of his life, they will have more weight and influence upon particular occasions.

Now there are four qualities, more especially suited to the character of an orator, which should always appear in his discourses, in order to render what he says acceptable to his hearers; and these are, *wisdom*, *integrity*, *benevolence*, and *modesty*.

1. *Wisdom* is necessary; because we easily give into those whom we esteem wiser and more knowing than ourselves. Knowledge is very agreeable and pleasant to all, but few make very great improvements in it; either by reason they are employed in other necessary affairs, and the mind of man cannot attend to many things at once; or because the way to knowledge at first is hard and difficult, so that persons either do not care to enter upon the pursuit of it, or, if they do, they are many times soon discouraged, and drop it, for want of sufficient resolution to surmount its difficulties. Such, therefore, as either cannot, or do not care to give themselves the trouble of examining into things themselves, must take up with the representation of others; and it is an ease to them to hear the opinion of persons whom they esteem wiser than themselves. No one loves to be deceived; and those who are fearful of being misled, are pleased to meet with a person, in whose wisdom, as they think, they can safely trust. The character of wisdom therefore is of great service to an orator, since the greater part of mankind are swayed by authority rather than arguments.

2. But this of itself is not sufficient, unless the opinion of *integrity* be joined with it. Nay, so far from it, that the greater knowledge and understanding a man is supposed to have, unless he likewise have the character of an honest man, he is often the more suspected. For knowledge without honesty, is generally thought to dispose a person, as well as qualify him, to deceive.

3. And to both these qualities the appearance of kindness and *benevolence* should likewise be added. For though a person have the reputation of wisdom and honesty, yet if we apprehend he is either not well affected to us, or at least regardless of our interest; we are in many cases apt to be jealous of him. Mankind are naturally swayed by their affections, and much influenced through love or friendship; and therefore nothing has a greater tendency to induce persons to credit what is said, than intimations of affection and kindness. The best orators have been always sensible, what great influence the expressions of kindness and bene-

Invention. benevolence have upon the minds of others, to induce them to believe the truth of what they say; and therefore they frequently endeavour to impress them with the opinion of it. Thus Demosthenes begins his celebrated oration for Ctesiphon. "It is my hearty prayer (says he) to all the deities, that this my defence may be received by you with the same affection which I have always expressed for you and your city." And it is a very fine image of it which we have in Cicero, where, in order to influence the judges in favour of Milo, he introduces him speaking thus, as became a brave man, and a patriot, even upon the supposition he should be condemned by them: "I bid my fellow citizens adieu; may they continue flourishing and prosperous; may this famous city be preserved, my most dear country, however it has treated me; may my fellow citizens enjoy peace and tranquillity without me, since I am not to enjoy it with them, though I have procured it for them; I will withdraw, I will be gone."

4. *Modesty.* It is certain, that what is modestly spoken, is generally better received than what carries in it an air of boldness and confidence. Most persons, though ignorant of a thing, do not care to be thought so; and would have some deference paid to their understanding. But he who delivers himself in an arrogant and assuming way, seems to upbraid his hearers with ignorance, while he does not leave them to judge for themselves, but dictates to them, and as it were demands their assent to what he says; which is certainly a very improper method to win upon them. For not a few, when convinced of an error in such a way, will not own it; but will rather adhere to their former opinion, than seem forced to think right, when it gives another the opportunity of a triumph. A prudent orator therefore will behave himself with modesty, that he may not seem to insult his hearers; and will set things before them in such an engaging manner, as may remove all prejudice either from his person or what he asserts. But at the same time, firmness and resolution is as necessary as modesty, that he may appear to confide in the justice and truth of his cause. For to speak timorously, and with hesitation, destroys the credit of what is offered; and so far as the speaker seems to distrust what he says himself, he often induces others to do the like.

But, as has been said already, great care is to be taken, that these characters do not appear feigned and counterfeit. For what is fictitious can seldom be long concealed. And if this be once discovered, it makes all that is said suspected, how specious soever it may otherwise appear.

It is further necessary, that the orator should know the world, and be well acquainted with the different tempers and dispositions of mankind. Nor indeed can any one reasonably hope to succeed in this province, without well considering the circumstances of time and place, with the sentiments and dispositions of those to whom he speaks; which, according to Aristotle, may be distinguished four ways, as they discover themselves by the several *affections, habits, ages, and fortunes* of mankind. And each of these require a different conduct and manner of address.

The *affections* denote certain emotions of the mind, which, during their continuance, give a great turn to

the disposition. For love prompts to one thing, and hatred to another. The like may be said of anger, lenity, and the rest of them.

Persons differ likewise according to the various *habits* of their mind. So a just man is inclined one way, and an unjust man another; a temperate man to this, and an intemperate man to the contrary.

And as to the several *ages* of men, Aristotle has described them very accurately; and how persons are differently affected in each of them. He divides the lives of men, considered as hearers, into three stages; youth, middle age, and old age.—Young men, he says, have generally strong passions, and are very eager to obtain what they desire; but are likewise very mutable, so that the same thing does not please them long. They are ambitious of praise, and quick in their resentments. Lavish of their money, as not having experienced the want of it. Frank and open, because they have not often been deceived; and credulous for the same reason. They readily hope the best, because they have not suffered much, and are therefore not so sensible of the uncertainty of human affairs; for which reason, they are likewise more easily deceived. They are modest from their little acquaintance with the world. They love company and cheerfulness, from the briskness of their spirits. In a word, they generally exceed in what they do; love violently, hate violently, and act in the same manner through the rest of their conduct.—The disposition of old men is generally contrary to the former. They are cautious, and enter upon nothing hastily; having in the course of many years been often imposed upon; having often erred, and experienced the prevailing corruption of human affairs; for which reason they are likewise suspicious, and moderate in their affections either of love or hatred. They pursue nothing great and noble, and regard only the necessities of life. They love money; having learnt by experience the difficulty of getting it, and how easily it is lost. They are fearful, which makes them provident. Commonly full of complaints, from bodily infirmities, and a deficiency of spirits. They please themselves rather with the memory of what is past, than any future prospect; having so short a view of life before them, in comparison of what is already gone: for which reason also, they love to talk of things past; and prefer them to what is present, of which they have but little relish, and know they must shortly leave them. They are soon angry, but not to excess. Lastly, they are compassionate, from a sense of their own infirmities, which makes them think themselves of all persons most exposed.—Persons of a middle age, betwixt these two extremes, as they are freed from the rashness and temerity of youth, so they have not yet suffered the decays of old age. Hence in every thing they generally observe a better conduct. They are neither so hasty in their assent as the one, nor so minutely scrupulous as the other, but weigh the reasons of things. They regard a decency in their actions; are careful and industrious; and as they undertake what appears just and laudable upon better and more deliberate consideration than young persons, so they pursue them with more vigour and resolution than those who are older.

As to the different *fortunes* of mankind, they may be considered as noble, rich, or powerful; and the contrary

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trary to these.—Those of high birth, and noble extraction, are generally very tender of their honour, and ambitious to increase it; it being natural for all persons to desire an addition to those advantages, of which they find themselves already possessed. And they are apt to consider all others as much their inferiors, and therefore expect great regard and deference should be shewn them.—Riches, when accompanied with a generous temper, command respect from the opportunities they give of being useful to others; but they usually elate the mind, and occasion pride. For as money is commonly said to command all things, those who are possessed of a large share of it, expect others should be at their beck; since they enjoy that which all desire, and which most persons make the main pursuit of their lives to obtain.—But nothing is more apt to swell the mind than power. This is what all men naturally covet, even when perhaps they would not use it. But the views of such persons are generally more noble and generous, than of those who only pursue riches and the heaping up of money. A state contrary to these gives a contrary turn of mind; and in lower life, persons dispositions usually differ according to their station and circumstances. A citizen and a courtier, a merchant and a soldier, a scholar and a peasant, as their pursuits are different, so is generally their turn and disposition of mind.

It is the orator's business, therefore, to consider these several characters and circumstances of life, with the different bias and way of thinking they give to the mind; that he may so conduct himself in his behaviour and manner of speaking, as will render him most acceptable, and gain him the good esteem of those to whom he addresses.

CHAP. VI. *Of the Passions.*

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As it is often highly necessary for the orator, so it requires his greatest skill, to engage the passions in his interest. Quintilian calls this *the soul and spirit of his art*. And, doubtless, nothing more discovers its empire over the minds of men, than this power to excite, appease, and sway their passions, agreeably to the design of the speaker. Hence we meet with the characters of *admirable, divine*, and other splendid titles, ascribed to eloquence by ancient writers. It has indeed been objected by some, that whatever high encomiums may be given of this art by the admirers of it, it is however distinguished to deceive and impose upon mankind, as those seem to do, who, by engaging their passions, give a bias to their minds, and take them off from the consideration of the truth; whereas every thing should be judged of from the reasons brought to support it, by the evidence of which it ought to stand or fall. But in answer to this, it may be considered, that all fallacy is not culpable. We often deceive children for their good; and physicians sometimes impose on their patients, to come at a cure. And why, therefore, when persons will not be prevailed with by reason and argument, may not an orator endeavour, by engaging their passions, to persuade them to that which is for their advantage? Besides, Quintilian makes it a necessary qualification of an orator, that he be an honest man, and one who will not abuse his art. But since those of a contrary charac-

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ter will leave no methods untried in order to carry their point, it is requisite for those who design well, to be acquainted with all their arts, without which they will not be a match for them; as in military affairs it is highly advantageous for the general of an army to get himself informed of all the designs and stratagems of the enemy, in order to counteract them. Indeed this part of oratory is not necessary at all times, nor in all places. The better prepared persons are to consider truth, and act upon the evidence of it, the less occasion there appears for it. But the greater part of mankind, either do not duly weigh the force of arguments, or refuse to act agreeably to their evidence. And where this is the case, that persons will neither be convinced by reason, nor moved by the authority of the speaker, the only way left to put them upon action, is to engage their passions. For the passions are to the mind, what the wind is to a ship: they move, and carry it forward; and he who is without them, is in a manner without action, dull and lifeless. There is nothing great or noble to be performed in life, wherein the passions are not concerned. The Stoics, therefore, who were for eradicating the passions, both maintained a thing in itself impossible, and which, if it was possible, would be of the greatest prejudice to mankind. For while they appeared such zealous assertors of the government of reason, they scarce left it any thing to govern; for the authority of reason is principally exercised in ruling and moderating the passions, which, when kept in a due regulation, are the springs and motives to virtue. Thus hope produces patience, and fear industry; and the like might be shewn of the rest. The passions therefore are not to be extirpated, as the Stoics asserted, but put under the direction and conduct of reason. Indeed where they are ungovernable, and instead of obeying command, they are, as some have fitly called them, *diseases of the mind*; and frequently hurry men into vice, and the greatest misfortunes of life: Just as the wind, when it blows moderately, carries on the ship; but if it be too boisterous and violent, may overset her. The charge therefore brought against this art, for giving rules to influence the passions, appears groundless and unjust; since the proper use of the passions is, not to hinder the exercise of reason, but to engage men to act agreeably to reason. And if an ill use be sometimes made of this, it is not the fault of the art, but of the artist.

We shall here consider the passions, as they may be separately referred, either to *demonstrative, deliberative, or judicial* discourses; though they are not wholly confined to any of them.

1. To the *demonstrative* kind, we may refer *joy and sorrow, love and hatred, emulation and contempt*.

Joy is an elation of the mind, arising from a sense of some present good. Such a reflection naturally creates a pleasant and agreeable sensation, which ends in a delightful calm and serenity. This is heightened by a description of former evils, and a comparison between them and the present felicity. Thus Cicero endeavours to excite in the minds of his fellow-citizens the highest sense of joy and delight at Catiline's departure from Rome, by representing to them the imminent danger which threatened both them and the city while he continued among them.

Sorrow, on the contrary, is an uneasiness of mind arising

Invention. arising from a sense of some present evil. This passion has generally a place in funeral discourses. And it may be heightened, like the former, by comparison, when any past happiness is set in opposition to a present calamity. Hence Cicero aggravates the sorrow at Rome occasioned by the death of Metellus, from his character, and great services to the public, while living.

Love excites us to esteem one another for some excellency, and to do him all the good in our power. It is distinguished from *Friendship*, which is mutual; and therefore love may continue where friendship is lost: that is, the affection may remain on one side. And when we assist a person from no other motive but to do him a kindness, Aristotle calls this *good-will*. Love takes its rise from a variety of causes. Generosity, benevolence, integrity, gratitude, courtesy, and other social virtues, are great incitements to love any one endued with such qualities. And persons generally love those who are of a like disposition with themselves and pursue the same views. It is therefore the chief art of a flatterer to suit himself in every thing to the inclination of the person whose good graces he courts. When the orator would excite this affection towards any person, it is proper to shew, that he is possessed of at least some, if not all, of these agreeable qualities. When the conspirators with Catiline were to be brought to justice, Cicero was very sensible of the envy he should contract on that account, and how necessary it was for him to secure the love of the Roman senate for his support and protection in that critical juncture. And this he endeavours to do in his fourth oration against Catiline, by representing to them, in the most pathetic manner, that all the labours he underwent, the difficulties he consisted with, and the dangers to which he was exposed on that account, were not for his own sake, but for their safety, quiet, and happiness.

Hatred is opposed to love, and produced by the contrary dispositions. And therefore persons hate those, who never did them any injury, from the ill opinion they have of their base and vicious inclinations. So that the way to excite this passion is, by shewing that any one has committed some heinous fact with an ill intent. And the more nearly affected persons are by such actions, in what they account of the greatest concern, the higher in proportion their hatred rises. Since life therefore is esteemed the most valuable good, Cicero endeavours to render Mark Anthony odious to the citizens of Rome, by describing his cruelty.

Emulation is a disquiet, occasioned by the felicity of another, not because he enjoys it, but because we desire the like for ourselves. So that this passion is in itself good and laudable, as it engages men to pursue those things which are so. For the proper objects of emulation are any advantages of mind, body, or fortune, acquired by study or labour.

Emulation therefore is excited by a lively representation of any desirable advantages which appear to be attainable, from the example of others who are or have been possessed of them. But where the felicity of another occasions an uneasiness, not from the want of it, but because he enjoys it, this passion is called *envy*, which the ancients describe as an hideous monster,

feeding upon itself, and being its own tormentor. Aristotle observes, that it most usually affects such persons as were once upon a level with those they envy. For most men naturally think so well of themselves, that they are uneasy to see those who were formerly their equals, advanced above them. But, as this is a base and vicious passion, the orator is not to be informed how to excite it, but how to lessen or remove it. And the method prescribed by Cicero for this purpose is, to shew that the things, which occasioned it, have not happened to the envied person undeservedly, but are the just reward of his industry or virtue; that he does not so much convert them to his own profit or pleasure, as to the benefit of others; and that the same pains and difficulties are necessary to preserve them, with which they were at first acquired.

Contempt is opposed to *emulation*, and arises from misconduct in things not of themselves vicious: As where a person either acts below his station and character, or affects to do that for which he is not qualified. Thus Cicero endeavours to expose Cæcilius, and bring him into contempt of the court, for pretending to rival him in the accusation of Verres, for which he was altogether unfit.

2. To *deliberative* discourses may be referred *fear*, *hope*, and *shame*.

Fear arises from the apprehension of some great and impending evil. For the greatest evils, while they appear at a distance, do not much affect us. Such persons occasion fear, who are possessed with power, especially if they have been injured, or apprehend so. Likewise those who are addicted to do injuries, or who bear us an ill will. And the examples of others, who have suffered in a like case, or from the same persons, help to excite fear. From the circumstances therefore either of the thing, or person, it will not be difficult for the orator to offer such arguments as may be proper to awaken this passion. So Demosthenes, when he would persuade the Athenians to put themselves in a condition of defence against king Philip, enumerates the several acts of hostility already committed by him against the neighbouring states. And because mens private concerns generally more affect them than what relates to the public; it is proper sometimes to shew the necessary connection these have with each other, and how the ruin of one draws the other after it.

The contrary passion to *fear* is *hope*; which arises, either from a prospect of some future good, or the apprehension of safety from those things which occasion our fear. Young persons are easily induced to hope the best, from the vigour of their spirits. And those who have escaped former dangers, are encouraged to hope for the like success for the future. The examples of others also, especially of wife and considerate men, have often the same good effect. To find them calm and sedate when exposed to the like dangers, naturally creates confidence and the hopes of safety. But nothing gives persons that firmness and steadiness of mind, under the apprehension of any difficulties, as a consciousness of their own integrity and innocence. Let dangers come from what quarter they will, they are best prepared to receive them. They can calmly view an impending tempest, observe the way of its approach, and prepare themselves in the best manner to avoid

avoid it. In Cicero's oration for the Manilian law, he encourages the Roman citizens to hope for success against Mithridates, if they chose Pompey for their general, from the many instances of his former successes, which he there enumerates.

Shame arises from the apprehension of those things that hurt a person's character. *Modesty* has been wisely implanted in mankind by the great Author of nature, as a guardian of virtue, which ought for this reason to be cherished with the greatest care; because, as Seneca has well observed, "if it be once lost, it is scarce ever to be recovered." Therefore the true cause or foundation of shame is any thing base or vitious; for this wounds the character, and will not bear reflection. And he must arrive at no small degree of insensibility, who can stand against such a charge, if he be conscious to himself that it is just. Therefore, to deter persons from vitious actions, or to expose them for the commission of them, the orator endeavours to set them in such a light as may most awaken this passion, and give them the greatest uneasiness by the reflection. And because the bare representation of the thing itself is not always sufficient for this purpose; he sometimes enforces it by enlarging the view, and introducing those persons as witnesses of the fact for whom they are supposed to have the greatest regard. Thus, when some of the Athenians, in an arbitration about certain lands which had been referred to them by the contending parties, proposed it as the shortest way of deciding the controversy, to take the possession of them into their own hands; Cydias, a member of the assembly, to dissuade them from such an unjust action, desired them to imagine themselves at that time in the general assembly of the states of Greece (who would all hear of it shortly), and then consider how it was proper to act. But where persons labour under an excess of modesty, which prevents them from exerting themselves in things fit and laudable, it may sometimes be necessary to shew, that it is faulty and ill grounded. On the other hand, *immodesty*, or impudence, which consists in a contempt of such things as affect the reputation, can never be too much discouraged and exposed. And the way of doing this is, to make use of such arguments as are most proper to excite shame. We have a very remarkable instance of it in Cicero's second Philippic, wherein he affixes this character upon Mark Anthony, through every scene of his life.

3. To judicial discourses, may be referred *anger* and *lenity*, *pity* and *indignation*.

Anger is a resentment, occasioned by some affront, or injury, done without any just reason. Now men are more inclined to resent such a conduct, as they think they less deserve it. Therefore persons of distinction and figure, who expect a regard should be paid to their character, can the less bear any indications of contempt. And those who are eminent in any profession or faculty, are apt to be offended, if reflections are cast either upon their reputation or art. Magistrates also, and persons in public stations, sometimes think it incumbent on them to resent indignities, for the support of their office. But nothing sooner inflames this passion, than if good services are rewarded with slights and neglect. The instance of Narsites, the Roman general, is remarkable in this

kind; who, after he had been successful in his wars against the Goths, falling under the displeasure of the emperor Justin, was removed from the government of Italy, and received by the empress with this taunt, *That he must be sent to weave among the girls*; which so provoked him, that he said he would weave such a web as they should never be able to unravel. And accordingly, he soon after brought down the Longobards, a people of Germany, into Italy; where they settled themselves in that part of the country, which from them is now called *Lombardy*. The time and place in which an injury was done, and other circumstances that attended it, may likewise contribute very much to heighten the fact. Hence Demosthenes, in his oration against Midias, endeavours to aggravate the injury of being struck by him, both as he was then a magistrate, and because it was done at a public festival. From hence it appears, that the persons, who most usually occasion this passion, are such as neglect the rules of decency, contemn and insult others, or oppose their inclinations; as likewise the ungrateful, and those who violate the ties of friendship, or requite favours with injuries. But when the orator endeavours to excite anger, he should be careful not to exceed due bounds in aggravating the charge, lest what he says, appear rather to proceed from prejudice, than a strict regard to the demerit of the action.

Lenity is the remission of anger. The designs of mens actions are principally to be regarded; and therefore what is done ignorantly, or through inadvertency, is sooner forgiven. Also to acknowledge a fault, submit, and ask pardon, are the ready means to take off resentment. For a generous mind is soon cooled by submission. Besides, he who repents of his fault, does really give the injured party some satisfaction, by punishing himself; as all repentance is attended with grief and uneasiness of mind, and this is apt very much to abate the desire of revenge. As, on the contrary, nothing is more provoking, than when the offender either audaciously justifies the fact, or confidently denies it. Men are likewise wont to lay aside their resentment, when their adversaries happen by some other means to suffer what they think a sufficient satisfaction. Lastly, easy circumstances, a lucky incident, or any thing which gives the mind a turn to mirth and pleasure, has a natural tendency to remove anger. For anger is accompanied with pain and uneasiness, which very ill suit joy and cheerfulness. The orator therefore, in order to assuage and pacify the minds of his auditors, will endeavour to lessen their opinion of the fault, and by that means to take off the edge of their resentment. And to this purpose, it will be proper either to represent that the thing was not designed, or that the party is sorry for it; or to mention his former services; as also to shew the credit and reputation which will be gained by a generous forgiveness. And this last topic is very artfully wrought up by Cicero, in his address to Cæsar, in favour of Ligarius.

Pity arises from the calamities of others, by reflecting, that we ourselves are liable to the like misfortunes. So that evils, considered as the common lot of human nature, are principally the cause of pity. And this makes the difference between *pity* and *good-will*, which

Disposition which arises merely from a regard to the circumstances of those who want our assistance. But considering the uncertainty of every thing about us, he must seem in a manner divested of humanity, who has no compassion for the calamities of others; since there is no affliction which happens to any man, but either that, or some other as great, may fall upon himself. But those persons are generally soonest touched with this passion, who have met with misfortunes themselves. And by how much greater the distress is, or the person appears less deserving it, the higher pity does it excite: for which reason, persons are generally most moved at the misfortunes of their relations and friends, or those of the best figure and character. The orator therefore, in order to excite the greater pity, will endeavour to heighten the idea of the calamity, from the several circumstances both of the thing itself and the person who labours under it. A fine example of this may be seen in Cicero's defence of Murena, *cap. 40. &c.*

Indignation, as opposed to *pity*, is an uneasiness at the felicity of another who does not seem to deserve

it. But this respects only external advantages, such as riches, honours, and the like; for virtues cannot be the object of this passion. Aristotle therefore says, "that pity and indignation are generally to be found in the same persons, and are both evidences of a good disposition." Now the orator excites this passion, by shewing the person to be unworthy of that felicity which he enjoys. And as, in order to move compassion, it is sometimes of use to compare the former happy state of the person with his present calamity; so here, the greater indignation is raised, by comparing his former mean circumstances with his present advancement: as Cicero does in the case of Vatinius.

These are the passions with which an orator is principally concerned. In addressing to which, not only the greatest warmth and force of expression is often necessary; but he must likewise first endeavour to impress his own mind with the same passion he would excite in others, agreeably to that of Horace:

My grief with others just proportion bears;
To make me weep, you must be first in tears.

PART II. OF DISPOSITION.

AS *Invention* supplies the orator with necessary materials, so *Disposition* directs him how to place them in the most proper and suitable order. *Disposition* therefore, considered as a part of oratory, naturally follows invention. And what is here chiefly intended by it is, the placing the several parts of a discourse in a just method and dependence upon one another.

Writers are not all agreed in determining the parts of an oration; though the difference is rather in the manner of considering them, than in the things themselves. But Cicero, whom we shall here follow, mentions six, namely, *Introduction, Narration, Proposition, Confirmation, Consolation, and Conclusion.*

CHAP. I. Of the Introduction.

26 THE design of this is to prepare the minds of the hearers for a suitable reception of the remaining parts that are to follow. And for this end, three things are requisite; that the orator gain the *good opinion* of his hearers, that he secure their *attention*, and give them some *general notion* of his subject.

1. *Good opinion.* When the orator introduces his discourse with his own person, he will be careful to do it with modesty, and seem rather to extenuate his virtues and abilities, than to magnify them. And where the nature of the subject may seem to require it, he will endeavour to shew, that some just and good reason induced him to engage in it. We have a very fine example of this in Cicero's oration for the poet Aulus Licinius Archias, which begins thus: "If I have any natural genius, which I am sensible how small it is; or any ability in speaking, wherein I own I have been very conversant; or any skill acquired from the study and precepts of the best arts, to which my whole life has been devoted: this Aulus Licinius has, in a particular manner, a right to demand of me the fruit of all these things. For as far back as I can remember, and call to mind what passed in my youth,

to the present time, he has been my chief adviser and encourager both to undertake and pursue this course of studies." When the orator sets out with the persons of those to whom the discourse is made, it is not unusual to commend them for their virtues, and those especially which have a more immediate relation to the present subject. Thus Cicero begins his oration of thanks for the pardon of Marcellus, with an encomium upon the mildness, clemency, and wisdom of Cæsar, to whom it was addressed. But sometimes he expresses his gratitude for past favours; as Cicero has done in his orations, both to the people and senate of Rome, after his return from banishment. And at other times he declares his concern for them and their interest; in which manner Cicero begins his fourth oration against Catiline, which was made in the senate. "I perceive (says he) that all your countenances and eyes are turned on me; I perceive that you are solicitous, not only for your own danger, and that of the state, but for mine likewise, if that should be removed. Your affection for me is pleasant in misfortunes, and grateful in sorrow; but I adjure you to lay it aside, and, forgetting my safety, consider yourselves and your children." But in judicial cases, both the character of the person whose cause he espouses, and that of the adverse party likewise, furnishes the orator with arguments for exciting the good-will of his hearers: The former, by commemorating his virtues, dignity, or merits, and sometimes his misfortunes and calamities. So Cicero in his defence of Flaccus, begins his oration in commending him on the account of his services done to the public, the dignity of his family, and his love to his country. And Demosthenes, in his oration against Midias, sets out with a recital of his vices, in order to recommend his own cause to the favourable opinion of the court.

2. *Attention.* On this head, Cicero says, "We shall be heard attentively by one of these three things; if we propose what is great, necessary, or for the in-

terest of those to whom the discourse is addressed." So that, according to him, the topics of attention are much the same with those of good opinion, when taken from the subject. And indeed, people are naturally led to attend either to those things or persons of which they have entertained a favourable opinion. But in order to gain this point, the orator sometimes thinks it proper to request the attention of his audience. Thus Cicero, in his defence of Cluentius, after having shewn the heinousness of the charge against him, concludes his introduction in the following manner, speaking to the judges: "Wherefore I intreat, that while I briefly and clearly reply to a charge of many years standing, you will, according to your usual custom, give me a kind and attentive hearing." And again, in his second Philippic, addressing himself to the senate: "But as I must say something for myself, and many things against Mark Anthony; one of these I beg of you, that you will hear me kindly, while I speak for myself; and the other I will undertake for, that when I speak against him, you shall hear me with attention." But though the introduction be the most usual and proper place for gaining attention, yet the orator finds it convenient sometimes to quicken and excite his hearers in other parts of his discourse, when he observes they flag, or has something of moment to offer.

3. Some general account of the subject of the discourse. This is always necessary, which the two others are not. And therefore it must be left to the prudence of the orator, when to use or omit them, as he shall judge proper, from the nature of his discourse, the circumstances of his hearers, and how he stands with them. But some account of the subject is what cannot be neglected. For every one expects to be soon informed of the design of the speaker, and what he proposes to treat of. Nor when they are all made use of, is it necessary they should always stand in the order we have here placed them. Cicero sometimes enters immediately upon his subject, and introduces the other heads afterwards. As in his third oration against Catiline, made to the body of the Roman people, which begins thus: "You see that the state, all your lives, estates, fortunes, wives and children, and this seat of the greatest empire, the most flourishing and beautiful city, having by the favour of heaven towards you, and my labours, counsels, and dangers, been this day rescued from fire and sword and the very jaws of destruction, are preserved and restored to you." And then he proceeds to recommend himself to their esteem and benevolence, from the consideration of these benefits.

These are the heads which commonly furnish matter for this part of a discourse. But orators often take occasion from the time, place, largeness of the assembly, or some other proper circumstance, to compliment their hearers, recommend themselves, or introduce the subject upon which they are about to treat. Instances of each of these may be met with in several of Cicero's orations. And sometimes they set out with some comparison, similitude, or other ornament, which they accommodate to the occasion of their discourse. Thus Isocrates enters upon his celebrated panegyric in praise of his countrymen the Athenians, with the following comparison: "I have often wondered, what could

be their design, who brought together these assemblies, and instituted the gymnical sports, to propose so great rewards for bodily strength; and to vouchsafe no honour to those, who applied their private labours to serve the public, and so cultivated their minds as to be serviceable to others, to whom they ought to have shewn greater regard. For although the strength of a champion was doubled, no benefit would from thence accrue to others; but all enjoy the prudence of one man, who will hearken to his advice." In some cases, orators have recourse to a more covert and artful way of opening their subject, endeavour to remove jealousies, apologize for what they are about to say, and seem to refer it to the candour of the hearers to judge of it as they please. Cicero appears to have been a perfect master of this art, and used it with great success. Thus his seventh Philippic, where he seems to express the greatest concern, lest what he was about to say should give any offence to the senate to whom he was speaking: "I," says he, "who always declared for peace, and to whom peace among ourselves, as it is wished for by all good men, was in a particular manner desirable; who have employed all my industry in the forum, in the senate, and in the defence of my friends, whence I have arrived to the highest honours, a moderate fortune, and what reputation I enjoy; I therefore, who owe what I am to peace, and without it could not have been the person I am, be that what it will, for I would arrogate nothing to myself; I speak with concern and fear, how you will receive what I am going to say; but I beg and intreat you, from the great regard I have always expressed for the support and advancement of your honour, that if any thing said by me should at first appear harsh or unfit to be received, you will notwithstanding please to hear it without offence, and not reject it till I have explained myself: I then, for I must repeat it again, who have always approved of peace, and promoted it, am against a peace with Mark Anthony." This is called *insinuation*; and may be necessary, where a cause is in itself doubtful, or may be thought so from the received notions of the hearers, or the impressions already made upon them by the contrary side. An honest man would not knowingly engage in a bad cause; and yet, though prevailing prejudice, that may be so esteemed which is not so in itself. In these cases, therefore, great caution and prudence are necessary to give such a turn to things, and place them in that view, as may be least liable to offence. And because it sometimes happens, that the hearers are not so much displeased at the subject as the person, Quintilian's rule seems very proper, when he says: "If the subject displeases, the character of the person should support it; and when the person gives offence, he should be helped by the cause."

CHAP. II. Of Narration.

THE orator having prepared his hearers to receive his discourses with candour and attention, and acquainted them with his general design in the introduction, before he proceeds directly to his subject, often finds it necessary to give some account of what preceded, accompanied, or followed upon it. And this he does in order to enlarge the view of the particular

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cular point in dispute, and place it in a clearer light. This is called *narration*; which is a recital of something done, in the order and manner in which it was done. Hence it is easy to perceive, what those things are which properly enter into a narration. And such are the cause, manner, time, place, and consequences of an action; with the temper, fortune, views, ability, associates, and other circumstances of those concerned in it. Not that each of these particulars is necessary in every narration; but so many of them at least, as are requisite to set the matter in a just light, and make it appear credible. Besides, in relating a fact, the orator does not content himself with such an account of it as is barely sufficient to render what he says intelligible to his hearers; but describes it in so strong and lively a manner, as may give the greatest evidence to his relation, and make the deepest impression upon their minds. And if any part of it appears at present less probable, he promises to clear up and remove any remaining doubts in the progress of his discourse. For the foundation of his reasoning afterwards is laid in the narration, from whence he takes his arguments for the confirmation. And therefore it is a matter of no small importance, that this part be well managed; since the success of the whole discourse so much depends upon it.

There are four properties required in a good narration; that it be short, clear, probable, and pleasant.

1. The brevity of a narration is not to be judged of barely from its length: for that may be too long, which contains but a little; and that too short, which comprehends a great deal. Wherefore this depends upon the nature of the subject, since some things require more words to give a just representation of them, and others fewer. That may properly therefore be called a *short narration*, which contains nothing that could well have been omitted, nor omits any thing which was necessary to be said. Now, in order to avoid both these extremes, care should be taken not to go further back in the account of things, nor to trace them down lower, than the subject requires; to say that only in the general, which does not need a more particular explication; not to assign the causes of things, when it is enough to shew they were done; and to omit such things as are sufficiently understood, from what either preceded, or was consequent upon them. But the orator should be careful, lest, while he endeavours to avoid prolixity, he run into obscurity. Horace was very sensible of this danger, when he said:

By striving to be short, I grow obscure.

2. *Perspicuity*. This may justly be esteemed the chief excellency of language. For as the design of speech is to communicate our thoughts to others, that must be its greatest excellence, which contributes most to this end; and that, doubtless, is perspicuity. As perspicuity therefore is requisite in all discourse, so it is particularly serviceable in a narration, which contains the substance of all that is to be said afterwards. Wherefore, if this be not sufficiently understood, much less can those things which receive their light from it. Now the following things render a narration clear and plain: Proper and significant words, whose meaning is well known and determined; short sentences, though full and explicit, whose parts are not per-

plexed, but placed in their just order; proper particles to join the sentences, and shew their connection and dependance on each other; a due reward to the order of time, and other circumstances necessary to be expressed; and lastly, suitable transitions.

3. *Probability*. Things appear probable, when the causes assigned for them appear natural; the manner in which they are described is easy to be conceived; the consequences are such as might be expected; the characters of the persons are justly represented; and the whole account is well attested, consistent with itself, and agreeable to the general opinion. Simplicity likewise in the manner of relating a fact, as well as in the style, without any reserve or appearance of art, contributes very much to its credibility. For truth loves to appear naked and open, stripped of all colouring or disguise. The conspiracy of Catiline was so daring and extravagant, that no one, but such a desperado, could ever have undertaken it with any hopes of success. However, Cicero's account of it to the senate was so full and exact, and so well suited to the character of the person, that it presently gained credit. And therefore, when, upon the conclusion of Cicero's speech, Catiline, who was present, immediately stood up, and desired they would not entertain such hard thoughts of his, but consider how much his family had always been attached to the public interest, and the great services they had done the state; their resentments rose so high, that he could not be heard: upon which he immediately left the city, and went to his associates.

4. The last thing required in a narration is, that it be *pleasant and entertaining*. And this is more difficult, because it does not admit of that accurate composition, and pompous dress, which delight the ear, and recommend some other parts of a discourse. For it certainly requires no small skill in the speaker, while he endeavours to express every thing in the most natural, plain, and easy manner, not to grow flat and tiresome. For Quintilian's remark is very just, that, "the most experienced orators find nothing in eloquence more difficult, than what all, who hear it, fancy they could have said themselves." And the reason of this seems very obvious. For as all art is an imitation of nature, the nearer it resembles that, the more perfect it is in its kind. Hence unexperienced persons often imagine that to be easiest, which suits best with those natural ideas to which they have been accustomed; till, upon trial, they are convinced of their mistake. Wherefore, to render this part of a discourse pleasant and agreeable, recourse must be had to variety, both in the choice of words, and turns of the expression. And therefore questions, admirations, interlocations, imagery, and other familiar figures, help very much to diversify and enliven a narration, and prevent it from becoming dull and tedious, especially when it is carried on to any considerable length.

Having given a brief account of the nature and properties of a narration, we shall now proceed to consider the uses of it.

Laudatory orations are usually as it were a sort of continued narration, set off and adorned with florid language and fine images proper to grace the subject, which is naturally so well fitted to afford pleasure and entertainment.

entertainment. Wherefore a separate narration is more suited to *deliberative* and *judicial* discourses. In Cicero's oration for the Manilian law (which is of the former kind), the design of the narration is to shew the Roman people the necessity of giving Pompey the command of the army against king Mithridates, by representing the nature of that war, which is done in the following manner. "A great and dangerous war (says he) threatens your revenues and allies from two very powerful kings, Mithridates and Tigranes; one of whom not being pursued after his defeat, and the other provoked, they think they have an opportunity to seize Asia. Letters are daily brought from those parts to worthy gentlemen of the equestrian order, who have large concerns there in farming your revenues: they acquaint me, as friends, with the state of the public affairs, and danger of their own; that many villages in Bichynia, which is now your province, are burnt down; that the kingdom of Ariobarzanes, which borders upon your revenues, is entirely in the enemy's power; that Lucullus, after several great victories, is withdrawn from the war; that he who succeeds him is not able to manage it; that all the allies and Roman citizens wish and desire the command of that war may be given to one particular person; and that he alone, and no other, is dreaded by the enemies. You see the state of the case; now consider what ought to be done." Here is an unhappy scene of affairs, which seemed to call for immediate redress. The causes and reasons of it are assigned in a very probable manner, and the account well attested by persons of character and figure. And what the consequences would be, if not timely prevented, no one could well be ignorant. The only probable remedy suggested in general is, the committing that affair to one certain person, which he afterwards shews at large could be no other than Pompey. But in Cicero's defence of Milo, (which is of the *judicial* kind), the design of the narration, which is greatly commended by Quintilian, is to prove, that, in the combat between Clodius and Milo, the former was the aggressor. And in order to make this appear, he gives a summary account of the conduct of Clodius the preceding year; and from the course of his actions and behaviour, shews the inveterate hatred he bore to Milo, who obstructed him in his wicked designs. For which cause he had often threatened to kill him, and given out that he should not live beyond such a time: and accordingly he went from Rome without any other apparent reason, but that he might have an opportunity to attack him in a convenient place near his own house, by which he knew Milo was then obliged to pass. Milo was in the senate that day, where he staid till they broke up, then went home, and afterwards set forward on his journey. When he came to the place in which he was to be assaulted, Clodius appeared every way prepared for such a design, being on horseback, and attended with a company of desperate ruffians ready to execute his commands; whereas Milo was with his wife in a chariot, wrapped up in his cloak, and attended with servants of both sexes. These were all circumstances which preceded the fact. And as to the action itself, with the event of it, the attack, as Cicero says, was begun by the attendants of Clodius from an higher

ground, who killed Milo's coachman: upon which Clodius, throwing off his cloak, leaped out, and made a brave defence against Clodius's men, who were got about the chariot. But Clodius, in the heat of the skirmish, giving out that Milo was killed, was himself slain by the servants of Milo, to avenge, as they thought, the death of their master. Here seems to be all the requisites proper to make this account credible. Clodius's open and avowed hatred of Milo, which proceeded so far as to threaten his life; the time of his leaving Rome; the convenience of the place; his habit and company so different from those of Milo, joined with his known character of a most profligate and audacious wretch, could not but render it very probable that he had formed that design to kill Milo. And which of them began the attack, might very reasonably be credited from the advanced ground on which Clodius and his men were placed; the death of Milo's coachman at the beginning of the combat; the skirmish afterwards at the chariot; and the reason of Clodius's own death at last, which does not appear to have been intended, till he had given out that Milo was killed.

But a distinct and separate narration is not always necessary in any kind of discourse. For if the matter was well known before, a set and formal narrative will be tedious to the hearers. Or if one party has done it already, it is needless for the other to repeat it. But there are three occasions especially, in which it may seem very requisite: when it will bring light to the subject; when different accounts have already been given out concerning it; or when it has been misrepresented by the adverse party. If the point in controversy be of a dubious nature, or not sufficiently known to the hearers, a distinct account of the matter, with the particular circumstances attending it, must be very serviceable, in order to let them into a true state of the case, and enable them to judge of it with greater certainty.

Moreover, where the opposite party has set the matter in a false light by some artful and invidious turn, or loaded it with any odious circumstances, it seems no less necessary that endeavours should be used to remove any ill impressions, which otherwise might remain upon the minds of the hearers, by a different and more favourable representation. And if any thing can be fixed upon to make the contrary account appear absurd or incredible, it ought particularly to be remarked. Thus Cicero, in his defence of Sextus Roscius, shews that he was many miles distant from Rome at the time he was charged to have killed his father there. "Now (says he), while Sextus Roscius was at America, and this Titus Roscius [*his accuser*] at Rome, Sextus Roscius [*the father*] was killed at the baths on Mount Palatine, returning from supper. From whence I hope there can be no doubt who ought to be suspected of the murder. And, were not the thing plain of itself, there is this further suspicion to fix it upon the prosecutor; that, after the fact was committed, one Manlius Glauca, an obscure fellow, the freedman, client, and familiar of this Titus Roscius, first carried the account of it to America, not to the son of the deceased, but to the house of Titus Capito his enemy;" with more to the same purpose. But what we bring it for is, to shew the use which

disposition Cicero makes of this narration for retorting the crime upon the prosecutors.

But the orator should be very careful, in conducting this part, to avoid every thing which may prejudice the cause he espouses. Falshood, and a misrepresentation of facts, are not to be justified; but no one is obliged to say those things which may hurt himself. We shall just mention one instance of this from Cicero, where he has shewn great skill in this respect, in pleading before Cæsar for the pardon of Ligarius, who had joined with Pompey in the civil war. For Ligarius, having been represented by the adverse party as an enemy to Cæsar, and so esteemed by Cæsar himself; Cicero very artfully endeavours in his narration to take off the force of this charge, by shewing, that, when the war first broke out, he refused to engage in it; which he would not have done, had he borne any personal hatred to Cæsar. "Quintus Ligarius (says he), before there was any suspicion of a war, went into Africa as a legate to the prosperous Caius Cædicius; in which he so approved himself, both to the Roman citizens and allies, that, when Cædicius left the province, the inhabitants would not be satisfied he should leave the government in the hands of any other person. Therefore Quintus Ligarius having excused himself in vain for some time, accepted of the government against his will; which he so managed during the peace, that both the citizens and allies were greatly pleased with his integrity and justice. The war broke out on a sudden, which those in Africa did not hear of till it was begun: but upon the news of it, partly through inconsiderate haste, and partly from blind fear, they looked out for a leader, first for their own safety, and then as they were affected; when Ligarius, thinking of home, and desirous to return to his friends, would not be prevailed on to engage in any affairs. In the mean time, Publius Accius Varus, the pretor, who was formerly governor of Africa, coming to Utica, recourse was immediately had to him, who very eagerly took upon himself the government; if that can be called a *government*, which was conferred on a private man by the clamour of the ignorant multitude, without any public authority. Ligarius, therefore, who endeavoured to avoid every thing of that kind, ceased to act soon after the arrival of Varus." Here Cicero ends his narrative. For, though Ligarius afterwards joined with Pompey's party, yet to have mentioned that, which was nothing more than what many others had done, whom Cæsar had already pardoned, could have served only to increase his displeasure against him. And therefore he doubtless shewed great skill in so managing his account as to take off the main force of the accusation, and by that means make way for his pardon, which he accordingly obtained.

CHAP. III. Of the Proposition.

28 IN every just and regular discourse, the speaker's intention is to prove or illustrate something. And when he lays down the subject upon which he designs to treat, in a distinct and express manner, this is called the *proposition*.

Orators use several ways in laying down the subject of their discourses. Sometimes they do it in one general proposition. We have an instance of this in Cicero's speech to the senate, the day after Cæsar was

killed, (as it is given us by Dion Cassius), in which his design was to persuade them to peace and unanimity. "This (says he) being the state of our affairs, I think it necessary that we lay aside all the discord and enmity which have been among us, and return again to our former peace and agreement." And then he proceeds to offer his reasons for this advice.

At other times, to give a clearer and more distinct view of their discourse, they subjoin to the proposition the general heads of argument by which they endeavour to support it. This method Cicero uses in his seventh Philippic, where he says, "I who have always commended and advised to peace, am against a peace with Mark Antony. But why am I averse to peace? Because it is safe, because it is dangerous, and because it is impracticable. And I beseech you to hear me with your usual candor, while I make out these three things."

But when the subject relates to several different things, which require each of them to be separately laid down in distinct propositions, it is called a *partition*; though some have made two kinds of *partition*, one of which they call *separation*, and the other *enumeration*. By the former of these, the orator shews in what he agrees with his adversary, and wherein he differs from him. So, in the case formerly mentioned, of a person accused of sacrilege for stealing private money out of a temple, he who pleads for the defendant says, "He owns the fact; but it being private money, the point in question is, Whether this be sacrilege?" And in the cause of Milo, Cicero, speaking of Clodius, says, "The point which now comes before the court, is not, Whether he was killed, or not; that we confess; but, Whether justly or unjustly." Now in reality here is no partition, since the former branch of the proposition is what is agreed upon, and given up; and consequently it is only the latter that remains to be disputed. It is called *enumeration*, when the orator acquaints his hearers with the several parts of his discourse, upon which he designs to treat. And this alone, properly speaking, is a *partition*. Thus Cicero states his plea in his defence of Muræna: "I perceive the accusation consists of three parts: the first respects the conduct of his life; the second, his dignity; and the third contains a charge of bribery."

There are three things requisite in a good partition; that it be *short*, *complete*, and consist but of a *few members*.

A partition is said to be *short*, when each proposition contains in it nothing more than what is necessary. So that the brevity here required is different from that of a narration; for that consists chiefly in things, this in words. And, as Quintilian justly observes, brevity seems very proper here, where the orator does not shew what he is then speaking of, but what he designs to discourse upon.

Again, it ought to be *complete* and perfect. And for this end, care must be taken to omit no necessary part in the enumeration.

But, however, there should be as *few heads* as is consistent with the nature of the subject. The ancient rhetoricians prescribe three or four at the most. And we do not remember that Cicero ever exceeds that number. But it is certain, the fewer they are, the better,

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better, provided nothing necessary be omitted. For too large a number is both difficult of retention, and apt to introduce that confusion, which partition is designed to prevent.

Hitherto we have been speaking only of those heads into which the subject, or general argument of the discourse, is at first divided. For it is sometimes convenient to divide these again, or at least some of them, into several parts or members. And when this happens, it is best done, as the speaker comes to each of them in the order at first laid down; by which means the memory of the hearers will be less burdened, than by a multitude of particulars at one and the same time. Thus Cicero, in his oration for the Manilian law, comprises what he designs to say under three general heads. "First (says he) I shall speak of the nature of the war, then of its greatness, and lastly about the choice of a general." And when he comes to the first of these, he divides it again into four branches; and shews, "how much the glory of the Romans, the safety of their allies, their greatest revenues, and the fortunes of many of their citizens, were all concerned in that war." The second head, in which he considers the greatness of the war, has no division. But when he comes to the third head, concerning the choice of a general, he divides that likewise into four parts; and shews, that so many virtues are necessary in a consummate general, such an one as was proper to have the management of that war, namely, *skill in military affairs, courage, authority, and success*: all which be attributes to Pompey. And this is the scheme of that celebrated oration.

Further, some divide their subject into two parts, and propose to treat upon it *negatively and positively*; by shewing first what it is not, and then what it is. But while they are employed to prove what it is not, they are not properly treating upon that, but something else; which seems as irregular, as it is unnecessary. For he who proves what a thing is, does at the same time shew what it is not. However, in fact, there is a sort of division by affirmation and negation, which may sometimes be conveniently used. As if a person, charged with killing another, should thus state his defence: *I had done right if I had killed him, but I did not kill him*. Here indeed, if the latter can be plainly made to appear, it may seem needless to insist upon the former. But if that cannot be so fully proved, but there may be room left for suspicion, it may be proper to make use of both: for all persons do not see things in the same light, and he who believes the fact, may likewise think it just; while he who thinks it unjust, may not believe it, but rather suppose, had it really been committed by the party, he would not have denied it, since he looked upon it as defensible. And this method of proceeding, Quintilian compares to a custom often used in traffic, when persons make a large demand at first, in order to gain a reasonable price. Cicero uses this way of reasoning, in his defence of Milo; but in the contrary order: that is, he first answers the charge; and then justifies the fact, upon the supposition that the charge was true. For he proves first, that Clodius was the aggressor; and not Milo, as the contrary party had asserted: and then to give the greater advantage to his cause, he proceeds to shew, that if Milo had been the

aggressor, it would however have been a glorious action to take off such an abandoned wretch, who was not only a common enemy to mankind; but had likewise often threatened his life.

A good and just partition is attended with considerable advantages. For it gives both light and ornament to a discourse. And it is also a great relief to the hearers, who, by means of these stops and rests, are much better enabled to keep pace with the speaker without confusion, and by calling their thoughts either way, from what has been said, both know and are prepared for what is to follow. And as persons, in travelling a road with which they are acquainted, go on with greater pleasure and less fatigue, because they know how far it is to their journey's end; so to be apprised of the speaker's design, and the several parts of his discourse which he proposes to treat on, contributes very much to relieve the hearer, and keep up his attention. This must appear very evident to all who consider how difficult it is to attend long and closely to one thing, especially when we do not know how long it may be before we are like to be released. Whereas, when we are before-hand acquainted with the scheme, and the speaker proceeds regularly from one thing to another, opportunity is given to ease the mind, by relaxing the attention, and recalling it again when necessary.

CHAP. IV. Of Confirmation.

THE orator having acquainted his hearers, in the proposition, with the subject on which he designs to discourse, usually proceeds either to prove or illustrate what he has there laid down. For some discourses require nothing more than an enlargement or illustration, to set them in a proper light, and recommend them to the hearers; for which reason, likewise, they have often no distinct proposition. But where arguments are brought in defence of the subject, this is properly *confirmation*. For, as Cicero defines it, "confirmation is that which gives proof, authority, and support to a cause, by reasoning." And for this end, if any thing in the proposition seems obscure, or liable to be misunderstood, the orator first takes care to explain it, and then goes on to offer such arguments for the proof of it, and represent them in such a light, as may be most proper to gain the assent of his hearers.

But here it is proper to observe, that there are different ways of reasoning suited to different arts. The mathematician treats his subject after another manner than the logician, and the orator in a method different from them both. The forms of reasoning used by orators are four; *Syllogism, Enthymem, Induction, and Example*.

1. By *Syllogism*. A syllogism is a form of reasoning which consists of three propositions, the last of which is deduced from the two former. The first of these is called the *major proposition*, or, for brevity, the *major*; the second, the *minor proposition*, or *minor*; and the third, the *conclusion*. But as the last is opposed to the other two jointly, they are called the *premises*, and this the *conclusion*. So we may reduce Cicero's argument, by which he endeavours to prove, that Clodius assaulted Milo, and not Milo Clodius, to a syllogism in this manner:

He was the aggressor, whose advantage it was to kill the other.
But it was the advantage of Clodius to kill Milo, and not Milo's to kill him.
Therefore Clodius was the aggressor, or he assaulted Milo.

The thing to be proved was, that Clodius assaulted Milo, which therefore comes in the conclusion: and the argument, by which it is proved, is taken from the head of profit or advantage. Thus the logician would treat this argument; and if either of the premises was questioned, he would support it with another syllogism. But this short and dry way of reasoning does not at all suit the orator: who not only for variety changes the order of the parts, beginning sometimes with the minor, and at other times with the conclusion, and ending with the major; but likewise clothes each part with such ornaments of expression, as are proper to enliven the subject, and render it more agreeable and entertaining. And he frequently subjoins, either to the major proposition, or minor, and sometimes to both, one or more arguments to support them; and perhaps others to confirm or illustrate them, as he thinks it requisite. Therefore, as a logical syllogism consists of three parts or propositions, a rhetorical syllogism frequently contains four, and many times five parts. And Cicero reckons this last the most complete. But all that is said in confirmation of either of the premises, is accounted but as one part. This will appear more evident by examples. By a short syllogism Cicero thus proves, that the Carthaginians were not to be trusted: "Those who have often deceived us, by violating their engagements, ought not to be trusted. For if we receive any damage by their treachery, we can blame no body but ourselves. But the Carthaginians have often so deceived us. Therefore it is madnels to trust them." Here the major proposition is supported by a reason. The minor needed none; because the treachery of the Carthaginians was well known. So that this syllogism consists of four parts. But by a syllogism of five parts he proves somewhat more largely and elegantly, that the world is under the direction of a wise governor. The major is this: "Those things are better governed which are under the direction of wisdom, than those which are not." This he proves by several instances: "A house managed with prudence has every thing in better order, and more convenient, than that which is under no regulation. An army commanded by a wise and skillful general, is in all respects better governed, than one which has a fool or a madman at the head of it. And the like is to be said of a ship, which performs her course best under the direction of a skillful pilot." Then he proceeds to the minor thus: "But nothing is better governed than the universe." Which he proves in this manner: "The rising and setting of the heavenly bodies keep a certain determined order; and the several seasons of the year do not only necessarily return in the same manner, but are suited to the advantage of the whole; nor did the vicissitudes of night and day ever yet become prejudicial, by altering their course." From all which he concludes, "That the world must be under the direction of a wise governor." In both these examples, the regular order of the parts is observed. We shall

therefore produce another, in which the order is directly contrary; for beginning with the conclusion, he proceeds next to the minor proposition, and so ends with the major. In his defence of Cælius, his design is to prove that Cælius had not led a loose and vicious life, with which his enemies had charged him. And this he does, by shewing he had closely followed his studies, and was a good orator. This may probably at first sight appear but a weak argument; though to him who considers, what Cicero every where declares necessary to gain that character, it may perhaps be thought otherwise. The sense of what he says here may be reduced to this syllogism.

Those who have pursued the study of oratory, so as to excel in it, cannot have led a loose and vicious life.

But Cælius has done this.

Therefore his enemies charge him wrongfully.

But let us hear Cicero himself. He begins with the conclusion, thus: "Cælius is not chargeable with profuseness, extravagancy, contracting of debts, or intemperance, a vice which age is so far from abating, that it rather increases it. Nay, he never engaged in amours, and those pleasures of youth, as they are called, which are soon thrown off, as reason prevails." Then he proceeds to the minor, and shews from the effects, that Cælius had closely applied himself to the best arts, by which he means those necessary for an orator: "You have now heard him make his own defence, and you formerly heard him engaged in a prosecution (I speak this to vindicate, not to applaud him), you could not but perceive his manner of speaking, his ability, his good sense, and command of language. Nor did he only discover a good genius, which will oftentimes do much of itself when it is not improved by industry; but what he said (if my affection for him did not bias my judgment) appeared to be the effect of learning, application, and study." And then he comes to the major: "But be assured, that those vices charged upon Cælius, and the studies upon which I am now discouraging, cannot meet in the same person. For it is not possible that a mind, disturbed by such irregular passions, should be able to go through what we orators do, I do not mean only in speaking, but even in thinking." And this he proves by an argument taken from the scarcity of good orators. "Can any other reason be imagined, why so few, both now, and at all times, have engaged in this province, when the rewards of eloquence are so magnificent, and it is attended with so great delight, applause, glory, and honour? All pleasures must be neglected; diversions, recreations, and entertainments omitted; and even the conversation of all our friends must in a manner be laid aside. This it is which detours persons from the labour and study of oratory; not their want of genius, or education."

II. By *Enthymem*. But orators do not often use complete syllogisms, but most commonly enthymems. An *enthymem* is an imperfect syllogism, consisting of two parts; the conclusion, and one of the premises. And in this kind of syllogism, that proposition is omitted, whether it be the major or minor, which is sufficiently manifest of itself, and may easily be supplied by the hearers. But the proposition that is expressed, is usually called the *antecedent*, and the

conclusion the consequent. So if the major of that syllogism be omitted, by which Cicero endeavours to prove that Clodius assaulted Milo, it will make this enthymem:

The death of Milo would have been an advantage to Clodius.

Therefore Clodius was the aggressor; or, therefore he assaulted Milo.

In like manner that other syllogism above-mentioned, by which he shews that the Carthaginians ought not to be trusted, by omitting the minor, may be reduced to the following enthymem:

Those who have often broke their faith, ought not to be trusted.

For which reason the Carthaginians ought not to be trusted.

Every one would readily supply the minor, since the perfidiousness of the Carthaginians was known to a proverb. But it is reckoned a beauty in enthymems, when they consist of contrary parts: because the turn of them is most acute and pungent. Such is that of Micipia in Sallust: "What stranger will be faithful to you, who are an enemy to your friends?" And so likewise that of Cicero for Milo, speaking of Clodius: "You sit as avengers of his death; whose life you would not restore, did you think it in your power." Orators manage enthymems in the same manner they do syllogisms; that is, they invert the order of the parts, and confirm the proposition by one or more reasons: and therefore a rhetorical enthymem frequently consists of three parts, as a syllogism does of five. Though strictly speaking, a syllogism can consist of no more than three parts, and an enthymem but of two: and the arguments brought to support either of the propositions constitute for many new enthymems, of which the part they are designed to prove is the conclusion. To illustrate this by an example:

An honest man thinks himself under the highest obligation to his country.

Therefore he should shun no danger to serve it.

In this enthymem the major is wanting, which would run thus: "He who is under the highest obligations to another, should shun no danger in order to serve him." This last proposition is founded upon the common principle of gratitude; which requires, that, to the utmost of our power, a return should be made in proportion to the kindness received. And this being a maxim generally allowed, it is omitted by the orator. But now this enthymem, consisting of the minor and conclusion, might be managed in some such manner as this, beginning with the conclusion: "An honest man ought to shun no danger, but readily expose his life for the safety and preservation of his country." Then the reason of this conduct might be added, which is the antecedent of the enthymem, or minor of the syllogism: "For he is sensible, that his obligations to his country are so many, and so great, that he can never fully requite them." And this again might be confirmed by an enumeration of particulars: "He looks upon himself as indebted to his country for every thing he enjoys; for his friends, relations, all the pleasures of life, and even for life itself." Now the orator calls this *one enthymem*, though in reality there are two: For the second reason, or argument,

added to the first, becomes the antecedent of a new enthymem, of which the first reason is the consequent. And if these two enthymems were expressed separately in the natural order of the parts, the former would stand thus: "An honest man thinks himself under the highest obligations to his country: therefore he ought to shun no danger for its preservation." The latter thus: "An honest man esteems himself indebted to his country for every thing he enjoys; therefore he thinks he is under the highest obligations to it." The same thing might be proved in the like way of reasoning, by arguments of a different kind. From comparison, thus: "As it would be thought base and ungrateful in a son not to hazard himself for the preservation of his father; an honest man must certainly esteem it so when his country is in danger." Or from an example, in this manner: "An honest man is like circumstances would propose to himself the example of Decius, who freely gave up his life for the service of his country. He gave up his life indeed, but did not lose it; for he cannot be said to have lost his life, who lives in immortal honour." And orators frequently intermix such arguments to adorn and illustrate their subject, with others taken from the nature and circumstances of things. And now, if we consider a little this method of reasoning, we shall find it the most plain and easy imaginable. For when any proposition is laid down, and one or more reasons subjoined to prove it, each reason joined with the proposition makes a distinct enthymem, of which the proposition is the conclusion. Thus Cicero, in his seventh Philippic, lays down this as the foundation of his discourse, "That he is against a peace with Mark Antony;" for which he gives three reasons: "Because it is base, because it is dangerous, and because it is impracticable." These severally joined with the proposition, form three enthymems; and upon each of these he discourses separately, which make up that oration. And this method is what persons for the most part naturally fall into, who know nothing of the terms *syllogism* or *enthymem*. They advance something, and think of a reason to prove it, and another perhaps to support that; and so far as their invention will assist them, or they are masters of language, they endeavour to set what they say in the plainest light, give it the best dress, embellish it with proper figures and different turns of expression; and, as they think convenient, illustrate it with similitudes, comparisons, and the like ornaments, to render it most agreeable, till they think what they have advanced sufficiently proved. As this method of arguing therefore is the most plain, easy, and natural; so it is what is most commonly used in oratory. Whereas a strict syllogistical way of discoursing is dry and jejune, cramps the mind, and does not admit of those embellishments of language which are a great advantage to the orator: for which reason he seldom uses complete syllogisms; and when he does, it is with great latitude. —However, syllogistical reasoning is very useful, though not in popular discourses: for every argument may be reduced to a syllogism; and if it will not hold in that form, there is certainly some flaw in it, which by that means will most easily be discovered.

III. By *induction*: That is, when one thing is inferred

ferred from several others, by reason of the similitude between them. And this way of reasoning is often very useful in popular discourses. For many persons are sooner moved by examples and similitudes, than by arguments taken from the nature of things. Every one either endeavours to think right, or at least would be effected so to do. But it is often no easy matter to take in the force of an argument, especially for those who have not been accustomed to examine things closely, and weigh them duly in their minds. And therefore, when this cannot be done without some pain and uneasiness to the mind, till it become habitual by practice, it is not to be wondered at if such persons are best pleased with that way of reasoning by which they imagine they can form a judgment of things with the greatest ease and facility. But though inductions are made from all kinds of similitudes, yet those usually carry the greatest force with them which are drawn from like facts. Such is that of Cicero in his oration for the Manilian law: for when some persons objected to Pompey's being entrusted with the Mithridatic war, as a thing not customary to put such an accession of power into the hands of one man; Cicero removes that objection, by producing several instances of the like nature, and particularly shews that more new honours had already been conferred on Pompey than upon any other Roman citizen before him, which had all been employed to the advantage of the state. "I will not (says he) take notice that two very great wars, the Punic and the Carthaginian, were both managed by one general; and two very powerful cities, which threatened this empire most, Carthage and Numantia, both destroyed by the same Scipio. I will not observe, that both you and your fathers thought fit to place the safety of the government alone in Caius Marius; and that the same person should carry on the war with Jugurtha, with the Cimbrians, and with the Teutones. You remember how many new powers have already been conferred on Pompey;" which he then proceeds to enumerate, and from thence infers, that the objection of novelty was no just reason against his being entrusted with the conduct of that important war. And as to other similitudes, it may thus be shewn by induction, that virtuous habits are gained and improved by practice. Bodily strength is increased and confirmed by daily exercise: All manual arts are acquired by repeated trials and experiments: The liberal sciences are also attained by constant study and application: And in like manner the mind is formed to virtue, and improved in it, by the continued practice of right actions.

But there is one particular form of induction called *Socratic*, because Socrates very frequently used that way of reasoning. It proceeds by several questions, which being separately granted, the thing designed to be inferred is afterwards put, which, by reason of its similitude with the several cases allowed before, cannot be denied. But this is a capacious way of reasoning; for while the respondent is not aware of what is designed to be inferred, he is easily induced to make those concessions, which otherwise he would not. Besides, it is not so well suited to continued discourses, as to those which are interlocutory; and therefore we meet with it oftener in the Socratic dialogues

both of Plato and Xenophon. However, it may be made use of in oratory by a figure called *subjectio*, when the same person first puts the question, and then makes the answer. So in the famous cause of Epaminondas, general of the Thebans, who was accused for refusing to surrender his command to his successor appointed by the state, till after he had engaged the enemy, and given them a total defeat, Cicero thus represents his accuser pleading for the words of the law against Epaminondas, who alleged the intention of it in his defence: "Should Epaminondas add that exception to the law, which, he says, was the intention of the writer, namely, *Except any one refuse to give up his command when it is for the interest of the public he should not*; would you admit of it? I believe not. Should you yourselves, which is a thing most remote from your justice and wisdom, in order to screen him, order this exception to be added to the law, without the command of the people; would the Thebans suffer it to be done? No certainly. Can it be right then to come into that, as if it was written, which it would be a crime to write? I know it cannot be agreeable to your wisdom to think so."

IV. By Example. Rhetoricians use this word in a different sense from the common acceptation. For that is usually called an *example*, which is brought either to prove or illustrate some general assertion: As if any one should say, that *human bodies may be brought to sustain the greatest labours by use and exercise*; and in order to prove this should relate what is said of Milo of Croton, that "by the constant practice of carrying a calf several furlongs every day, he could carry it as far after it was to its full size." But in oratory the word *example* is used for any kind of similitude; or, as Vossius defines it, "When one thing is inferred from another, by reason of the likeness which appears between them." Hence it is called an *imperfect induction*, which infers something from several others of a like nature. But, as was observed before, in speaking of induction, so likewise in examples, those have the greatest force in reasoning, which are taken from facts. Now facts may be compared with respect to some agreement or similitude between them, which in themselves are either equal or unequal. Of the former kind this is an instance: "Cato acted as became a patriot and a lover of his country's liberty, in opposing the arms of Cæsar: and therefore so did Cicero." The reason of the inference is founded in the parity of the case, which equally concerned all good subjects of the Roman government at that time. For all were alike obliged to oppose a common enemy, who endeavoured to subvert the constitution, and subject them to his own arbitrary power. But though an example consists in the comparison of two single facts, yet several persons may be concerned in each fact. Of this kind is that which follows: "As Pompey, Cæsar, and Crassus, acted illegally in the first triumvirate, by engrossing the sole power into their own hands, and by that means violating the public liberty; so likewise did Augustus, Mark Anthony, and Lepidus, in the second triumvirate, by pursuing the same measures." But when Cicero defends Milo for killing Clodius, from the like instances of Anala Servilius, Scipio Nasica, Lucius Opimius, and others; that is not an example, but an induction; because one

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thing is there inferred from its similitude to several others. But when a comparison is made between two facts that are unequal, the inference may be either from the greater to the less, or from the less to the greater. From the greater to the less in this manner: "Cæsar had no just pretensions to the Roman government, and therefore much less had Anthony." The reason lies in the difference between the two persons. Cæsar had very much enlarged the bounds of the Roman empire by his conquests, and greatly obliged the populace by his generosity; but as he had always acted by an authority from the senate and people of Rome, these things gave him no claim to a power over them. Much less then had Anthony any such pretence, who always acted under Cæsar, and had never performed any signal services himself. Cicero has described the difference between them in a very beautiful manner in his second Philippic, thus speaking to Anthony: "Are you in any thing to be compared to him? He had a genius, sagacity, memory, learning, care, thought, diligence; he had performed great things in war, though detrimental to the state; he had for many years designed to get the government into his hands, and obtained his end by much labour and many dangers; he gained over the ignorant multitude by public shows, buildings, congiaries, and feasts; obliged his friends by rewards, and his enemies by a show of clemency. In a word, he subjected a free state to slavery, partly through fear, and partly compliance. I can liken you to him for ambition of power; but in other things you are in no respect to be compared with him." By a comparison from the less to the greater, Cicero thus argues against Catiline: "Did the brave Scipio, when a private man, kill Tiberius Gracchus, for attempting to weaken the state; and shall we consuls bear with Catiline endeavouring to destroy the world by fire and sword?" The circumstances of these two cases were very different; and the comparison runs between a private man, and a consul intrusted with the highest authority; between a design only to raise a tumult, and a plot to destroy the government: whence the orator justly infers, that what was esteemed lawful in one case, was much more so in the other. The like way of reasoning is sometimes used from other similitudes, which may be taken from things of all kinds, whether animate or inanimate. Of the former sort is that of Cicero speaking of Muræna, when candidate for the consulship, after he had himself gone through that office: "If it is usual (says he) for such persons as are safely arrived in port, to give those who are going out the best account they can with relation to the weather, pirates, and coasts; because thus nature directs us to assist those who are entering upon the same dangers which we ourselves have escaped: how ought I, who now after a great storm am brought within a near prospect of land, to be affected towards him, who, I perceive, must be exposed to the greatest tempests of the state?" He alludes to the late disturbances and tumults occasioned by the conspiracy of Catiline, which had been so happily suppressed by him in the time of his consulship. Of the latter kind is that of Quintilian: "As the ground is made better and more fruitful by culture, so is the mind by instruction." There is both a beauty and justness in this simile.

But comparisons are sometimes made between facts and other things, in order to infer some difference or opposition between them. In comparing two facts, on account of some disagreement and unlikeness, the inference is made from the difference between one and the other in that particular respect only. As thus: "Though it was not esteemed cruelty in Brutus to put his two sons to death, for endeavouring to betray their country; it might be so in Manlius, who put his son to death, only for engaging the enemy without orders, though he gained the victory." The difference between the two facts, lies in the different nature of the crime. The sons of Brutus entered into a conspiracy to betray their country; and though they miscarried in it, yet the intention and endeavours they used to accomplish it were criminal in the highest degree. But young Manlius could only be charged with rashness. His design was honourable, and intended for the interest of his country; only it was irregular, and might have proved of ill consequence to military discipline. Now in all such cases, the force of the argument is the stronger, the greater the difference appears. But the same facts which differ in one respect, may agree in many others; as in the example here mentioned. Brutus and Manlius were both magistrates as well as fathers; they both killed their sons, and that for a capital crime by the Roman law. In any of which respects they may be compared in a way of similitude: as, "If Brutus might lawfully put his son to death for a capital crime, so might Manlius." But now contrary facts do not only differ in some certain respect, but are wholly opposite to each other; so that what is affirmed of the one, must be denied of the other; and if one be a virtue, the other is a vice. Thus Cicero compares the conduct of Marcellus and Verres in a way of opposition. "Marcellus (says he), who had engaged, if he took Syracuse, to erect two temples at Rome, would not beautify them with the spoils he had taken: Verres, who had made no vows to Honour and Virtue, but to Venus and Cupid, endeavoured to plunder the temple of Minerva. The former would not adorn the gods with the spoils of other deities: the latter carried the ornaments of Minerva, a virgin, into the house of a strumpet." If therefore the conduct of Marcellus was laudable and virtuous, that of Verres must bear the contrary character. But this way of reasoning has likewise place in other respects. Thus Cicero, in the quarrel between Cæsar and Pompey, advised to peace from the difference between a foreign and domestic war: "That the former might prove beneficial to the state; but in the latter, whichever side conquered, the public must suffer." And thus the ill effects of intemperance may be shewn in a way of opposition: "That as temperance preserves the health of the body, keeps up the vigour of the mind, and prolongs life; so excess must necessarily have the contrary effects."

Thus we have given a brief account of the principal ways of reasoning commonly made use of by orators. As to the disposition of arguments, or the order of placing them, some advise to put the weaker, which cannot wholly be omitted, in the middle: And such as are stronger, partly in the beginning, to gain the esteem of the hearers and render them more attentive; and partly at the end, because what is last heard is likely

Disposition to be retained longest: But if there are but two arguments, to place the stronger first, and then the weaker; and after that to return again to the former, and infit principally upon that. But this must be left to the prudence of the speaker, and the nature of the subject. Though to begin with the strongest, and so gradually descend to the weakest, can never be proper, for the reason last mentioned. Nor ought arguments to be crowded too close upon one another; for that takes off from their force, as it breaks in upon the attention of the hearers, and does not leave them sufficient time duly to consider them. Nor indeed should more be used than are necessary; because the fewer they are, the more easily they are remembered. And the observation of a great master of eloquence upon this subject is certainly very just, that *arguments ought rather to be weighed than numbered.*

CHAP. V. Of Confutation.

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THE forms of reasoning here are the same as have been already explained under *confirmation*. *Confutation*, however, is often the more difficult task: because he who is to prove a thing, comes usually prepared; but he who is to confute it, is frequently left to a sudden answer. For which reason, in *judicial* cases, Quintilian says, "It is as much easier to accuse than defend, as it is to make a wound than to heal it." Therefore, not only a good judgment, but a readiness of thought also, seems necessary for this province. But, in all disputes, it is of the greatest consequence to observe where the stress of the controversy lies. For without attending to this, persons may cavil about different matters without understanding each other, or deciding any thing. And in confutation, what the adversary has advanced ought carefully to be considered, and in what manner he has expressed himself. As to the things themselves; whether they immediately relate to the matter in dispute, or are foreign to it. Those things that are foreign to the subject, may either be pass over in silence, or in a very few words shewn to be insignificant. And there ought likewise to be a distinction made between such things as relate to the subject, according to their importance. Those that appear to have no great weight, should be slightly remarked. For to insist largely upon such matters is both tiresome to the hearers, and apt to bring the judgment of the speaker into question. And therefore things of that nature are generally better turned off with an air of neglect, a pungent question, or an agreeable jest, than confuted by a serious and laboured answer. 2. But those things, which relate to the merits of the cause, may be confuted either by *contradicting* them, or by shewing some *mistake* in the reasoning, or their *invalidity* when granted.

Things may be *contradicted* several ways. What is apparently false may be expressly denied. Thus Cicero in his defence of Cluentius: "When the accuser had said, that the man fell down dead after he had drunk off his cup, denies that he died that day." And things which the adversary cannot prove, may likewise be denied. Of which we have also an instance in Cicero, who first upbraids Mark Anthony as guilty of a breach not only of good breeding, but likewise of friendship, for reading publicly a private letter he had sent him. And then adds: "But what will you say now,

Disposition if I should deny that ever I sent you that letter? How will you prove it? By the hand-writing? In which I confess you have a peculiar skill, and have found the benefit of it. But how can you make it out? For it is in my secretary's hand. I cannot but envy your master, who had so great a reward for teaching you to understand just nothing. For what can be more unbecoming not only an orator, but even a man, than for any one to offer such things, which if the adversary denies, he has nothing more to say?" It is an handsome way of contradicting a thing, by shewing, that the adversary himself maintained the contrary. So when Oppius was charged with defrauding the soldiers of their provisions, Cicero refutes it, by proving, that the same persons charged Oppius with a design to corrupt the army by his liberality. An adversary is never more effectually silenced than when you can fasten contradictions upon him; for this is stabbing him with his own weapon. Sometimes a thing is not in express terms denied, but represented to be utterly incredible. And this method exposes the adversary more than a bare denial. So when some persons reproached Cicero with cowardice, and a shameful fear of death; he recites their reasons in such a manner, that any one would be inclined to think the charge entirely false. "Was it becoming me (says he) to expect death with that composedness of mind as some have imagined? Well, and did I then avoid it? Nay, was there any thing in the world that I could apprehend more desirable: Or when I had done the greatest things in such a crowd of ill-minded persons about me, do you think banishment and death were not always in my view, and continually sounding in my ears as my certain fate, while I was so employed? Was life desirable, when all my friends were in such sorrow, and myself in so great distress, deprived of all the gifts both of nature and fortune? Was I so unexperienced, so ignorant, so void of reason and prudence? Had I never seen nor heard any thing in my whole life? Did all I had read and studied avail nothing? What! did not I know that life is short, but the glory of generous actions permanent? When death is appointed for all, does it not seem eligible, that life, which must be wrested from us, should rather be freely devoted to the service of our country, than reserved to be worn out by the decays of nature? Was not I sensible, there has been this controversy among the wisest men, that some say, the minds of men and their consciousness utterly perish at death; and others, that the minds of wise and brave men are then in their greatest strength and vigour, when they are set free from the body? The first state is not greatly to be dreaded, to be void of sense; but the other, of enjoying larger capacities, is greatly to be desired. Therefore, since I always aimed at dignity, and thought nothing was worth living for without it; how should I, who am past the consulship, and did so great things in it, be afraid to die?" Thus far Cicero. There is likewise an ironical way of contradicting a thing, by retorting that and other things of the like nature upon the adverse party. Thus Cicero, in his oration against Vatinius, says: "You have objected to me, that I defended Cornelius, my old friend, and your acquaintance. But pray why should I not have defended him? Has Cornelius carried any law contrary to the omens? Has he violated any

any law? Has he assaulted the consul? Did he take possession of a temple by force of arms? Did he drive away the tribune, who opposed the passing a law? Has he thrown contempt upon religion? Has he plundered the treasury? Has he pillaged the state? No, these, all these, are your doings?" Such an unexpected return is sometimes of great service to abate the confidence of an adversary.

A second way of confutation is, by observing some *flaw* in the reasoning of the adverse party. We shall endeavour to illustrate this from the several kinds of reasoning treated of before under *confirmation*. And first, as to *sylogisms*; they may be refuted, either by shewing some mistake in the premises, or that the conclusion is not justly deduced from them. So when the Clodian party contended, that Milo ought to suffer death for this reason, Because he had confessed that he had killed Clodius; that argument, reduced to a *sylogism*, would stand thus:

He who confesses he has killed another, ought not to be allowed to see the light.

But Milo confesses this.

Therefore he ought not to live.

Now the force of this argument lies in the major or first proposition; which Cicero refutes, by proving, that the Roman people had already determined contrary to what is there asserted: "In what city (says he) do these men dispute after this weak manner? In that wherein the first capital trial was in the case of the brave Horatius, who, before the city enjoyed perfect freedom, was saved by the suffrages of the Roman people, though he confessed that he killed his sister with his own hand." But when Cicero accused Verres for mal-administration in his government of Sicily, Hortensius, who defended him, being sensible the allegations brought against him could not be denied, had no other way left to bring him off, but by pleading his military virtues in abatement, which at that time were much wanted, and very serviceable to the state. The form of the argument was this:

That the Romans then wanted good generals.

That Verres was such.

And consequently, that it was for the interest of the public that he should not be condemned.

But Cicero, who knew his design, states the argument for him in his charge; and then answers it by denying the consequence, since the crimes of Verres were of so heinous a nature, that he ought by no means to be pardoned on the account of any other qualifications: Though indeed he afterwards refutes the minor or second proposition, and shews that he had not merited the character of a good general. Enthymems may be refuted, either by shewing that the antecedent is false, or the consequent not justly inferred from it. As thus, with respect to the former case:

A strict adherence to virtue has often proved detrimental.

Therefore virtue ought not constantly to be embraced.

Here the antecedent may be denied. For virtue is always beneficial to those who strictly adhere to it, both in the present satisfaction it affords them, and the future rewards they may certainly expect from it. And as to the latter case, in this manner:

She is a mother.

Therefore she loves her children.

Now as the certainty of that inference depends upon this general assertion, That all mothers love their children, which is not true, the mistake of the reasoning may be shewn from the instance of Medea and others, who destroyed their own children. As to *induction* and *example*, by which the truth or equity of a thing is proved from its likeness to one or more other things; the reasoning in either is invalid, if the things so compared can be shewn not to have that similitude or agreement on which the inference is founded. One instance therefore may serve for both. As when Cicero, after the death of Cæsar, pleaded for the continuance of his laws, but not of those which were made afterwards by Mark Anthony: Because, though both were in themselves invalid, and impositions upon the public liberty; yet some of Cæsar's were useful, and others could not be set aside without disturbance to the state, and injuring particular persons; but those of Anthony were all detrimental to the public.

The last method of *confutation* before-mentioned was, when the orator does in some sense *grant* the adversary his argument, and at the same time shews its *invalidity*. And this is done by a variety of ways, according to the different nature of the subject. Sometimes he allows what was said may be true; but pleads, that what he contends for is necessary. This was the method by which Hortensius proposed to bring off Verres, as we have already shewn from Cicero, whose words are these, addressing himself to the judges: "What shall I do? which way shall I bring in my accusation? where shall I turn myself? for the character of a brave general is placed like a wall against all the attacks I can make. I know the place, I perceive where Hortensius intends to display himself. He will recount the hazards of war, the necessities of the state, the scarcity of commanders; and then he will intreat you, and do his utmost to persuade you, not to suffer the Roman people to be deprived of such a commander upon the testimony of the Sicilians, nor the glory of his arms to be sullied by a charge of avarice." At other times the orator pleads, that although the contrary opinion may seem to be attended with advantage, yet that his own is more just or honourable. Such was the case of Regulus, when his friends endeavoured to prevail with him to continue at Rome, and not return to Carthage, where he knew he must undergo a cruel death. But as this could not be done without violating his oath, he refused to hearken to their persuasions. Another way of confutation is, by retorting upon the adversary his own argument. Thus Cicero, in his defence of Ligarius, says: "You have, Tubero, that which is most desirable to an accuser, the confession of the accused party; but yet such a confession, that he was on the same side that you, Tubero, chose yourself, and your father too, a man worthy of the highest praise. Wherefore, if there was any crime in this, you ought first to confess your own before you attempt to fasten any upon Ligarius." The orator takes this advantage where an argument proves too much, that is, more than the person designed it for, who made use of it. Not much unlike this is what they call *inversion*, by which the orator shews, that the reasons offered by the opposite party make for him. So when Cæcilius urged, that the province of ac-

Disposition accusing Verres ought to be granted to him, and not to Cicero, because he had been his treasurer in Sicily at the time those crimes were committed with which he was charged, and consequently knew most of that affair; Cicero turns the argument upon him, and shews, for that very reason he was the most unfit of any man to be intrusted with his prosecution; since having been concerned with him in his crimes, he would certainly do all in his power to conceal or lessen them. Again, sometimes the charge is acknowledged, but the crime shifted off to another. Thus, when Sextus was accused of sedition, because he had got together a body of gladiators, and brought them into the forum, where a warm engagement happened between them and Clodius's faction; Cicero owns the fact, but charges the crime of sedition upon Clodius's party in being the aggressors. Another method made use of for the same purpose is, to alleviate the charge, and take off the force of it, by shewing, that the thing was not done with that intention which the adversary insinuates. Thus Cicero, in his defence of king Dejotarus, owns he had raised some forces, though not to invade the Roman territories, as had been alleged, but only to defend his own borders, and send aid to the Roman generals.

We have hitherto been speaking of the methods of confutation used by orators, in answering those arguments which are brought by the contrary party. But sometimes they raise such objections themselves to what they have said, as they imagine may be made by others; which they afterwards answer, the better to induce their hearers to think, that nothing considerable can be offered against what they have advanced, but what will admit of an easy reply. Thus, when Cicero, at the request of the Sicilians, had undertaken the accusation of Verres, it came under debate, whether he, or Cæcilius, who had been Verres's quaestor in Sicily, should be admitted to that province. Cicero, therefore, in order to let him aside, among other arguments, shews his incapacity for such an undertaking, and for that end recounts at large the qualifications necessary for an orator. Which he represents to be so many and great, that he thought it necessary to start the following objection to what he had himself said upon that subject. "But you will say perhaps, Have you all these qualifications?" To which he thus replies: "I wish I had; but it has been my constant study from my youth to gain them. And if, from their greatness and difficulty, I have not been able to attain them, who have done nothing else through my whole life; how far, do you imagine, you must be from it, who never thought of them before; and even now, when you are entering upon them, have no apprehension, what, and how great, they are?" This is an effectual way of defeating an adversary, when the objection is well founded, and clearly answered. But we shall have occasion to consider this matter more largely hereafter, under the figure *prolepsis*, to which it properly relates.

CHAP. VI. Of the Conclusion.

RHETORICIANS make this conclusion of a discourse to consist of two parts; recapitulation; and an address to the passion.

1. *Recapitulation* is a summary account of what the

speaker has before offered in maintenance of his subject; and is designed both to refresh the memory of the hearers, and to bring the principal arguments together into a narrow compass, that they may appear in a stronger light. Now there are several things necessary to a good repetition.

And first, it must be short and concise; since it is designed to refresh the memory, and not to burden it. For this end, therefore, the chief things only are to be touched upon; those on which the cause principally depends, and which the orator is most desirous should be regarded by his hearers. Now these are, The general heads of the discourse, with the main arguments brought to support them. But either to insist particularly upon every minute circumstance, or to enlarge upon those heads which it may be thought proper to mention, carries in it not so much the appearance of a repetition, as of a new discourse.

Again, it is convenient in a repetition to recite things in the same order in which they were at first laid down. By this means the hearers will be enabled much better to keep pace with the speaker as he goes along; and if they happen to have forgot any thing, they will the more readily readily recall it. And besides, this method appears most simple and open, when the speaker reviews what he has said in the same manner it was before delivered, and sets it in the clearest light for others to judge of it. But though a repetition contains only the same things which had been more largely treated of before; yet it is not necessary they should be expressed in the same words. Nay, this would many times be tiresome and unpleasant to the hearers; whereas a variety of expression is grateful, provided the sense be the same. Besides, every thing ought now to be represented in the strongest terms, and in so lively manner, as may at the same time both entertain the audience, and make the deepest impression upon their minds. We have a very exact and accurate example of repetition in Cicero's oration for Quintus. Cicero was then a young man, and seems to have kept more closely to the rules of art, than afterwards, when by use and practice he had gained a greater freedom of speaking. We formerly cited the partition of this speech, upon another occasion, which runs thus: "We deny, Sextus Nevius, that you was put into the possession of the estate of P. Quintius, by the praetor's edict. This is the dispute between us. I will therefore show, first, that you had no just cause to apply to the praetor for possession of the estate of P. Quintius; then, that you could not possess it by the edict; and lastly, that you did not possess it. When I have proved these three things, I will conclude. Now Cicero begins his conclusion with a repetition of those three heads, and a summary account of the several arguments he made use of under each of them. But they are too long to be here exhibited. In his oration for the Manilian law, his repetition is very short. He proposed in the partition to speak to three things: The nature of the war against king Mithridates, the greatness of it, and what sort of general was proper to be intrusted with it. And when he has gone thro' each of these heads, and treated upon them very largely, he reduces the substance of what he has said to this general and short account: "Since therefore the war is so necessary, that it cannot be neglected; and so great,

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great, that it requires a very careful management; and you can intrust it with a general of admirable skill in military affairs, of singular courage, the greatest authority, and eminent success: do you doubt to make use of this so great a blessing, conferred and bestowed upon you by heaven, for the preservation and enlargement of the Roman state?" Indeed this repetition is made by Cicero, before he proceeds to the confutation; and not at the end of his discourse, where it is usually longer and more particular: however, this may serve to shew the nature of such a recital.

But sometimes a repetition is made, by running a comparison between the speaker's own arguments, and those of the adverse party; and placing them in opposition to each other. And this method Cicero takes in the conclusion of his third oration upon the Agrarian law. And here sometimes the orator takes occasion to find fault with his adversary's management, in these and such like expressions: "This part he has entirely dropt. To that he has given an invidious turn, or a false colouring. He leaves arguments, and flies to intreaties; and not without good reason, if we consider the weakness of his cause."

But when the discourse is very long, and the arguments insisted on have been many, to prevent the hearers growing out of patience by a more particular recital, the orator sometimes only just mentions such things, which he thinks of least consequence, by saying, that he omits or passes over them, till he comes to what is of greater moment, which he represents more fully. This method Cicero has taken in his defence of Cluentius; where, having run over several lesser heads in the manner now described, he then alters his expression, and introduces what was of more importance, by saying: "What I first complain of, is that wickedness, which is now discovered." And so he proceeds more particularly to recite those things which immediately related to Cluentius. And this is what the writers upon this art call *preterition*. But thus much may serve for repetition or recapitulation.

2. We now proceed to the other part of the conclusion, which consists in an *address to the passions*. Indeed the orator sometimes endeavours occasionally to work upon the passions of his hearers in other parts of his discourse, but more especially in the conclusion, where he is warmest himself, and labours to make them so. For the main design of the introduction is to conciliate the hearers, and gain their attention; of the narration, proposition, and confirmation, to inform them; and of the conclusion, to move them. And therefore, to use Quintilian's words, "Here all the springs of eloquence are to be opened. It is here we secure the minds of the hearers, if what went before was well managed. Now we are pelt the rocks and shallows, all the fails may be hoisted. And as the greatest part of the conclusion consists in illustration, the most pompous language and strongest figures have place here." Now the passions, to which the orator more particularly addresses, differ according to the nature of the discourse. In demonstrative orations, when laudatory,—love, admiration, and emulation, are usually excited; but in invectives,—hated, envy, and contempt. In deliberative subjects, either the hope of gratifying some desire is set in view, or the fear of some impending evil. And in judicial dis-

courses, almost all the passions have place, but more especially resentment and pity; inasmuch that most of the ancient rhetoricians mention only these two. But having treated upon the nature of the passions, and the methods suited both to excite and allay them, in a former chapter, we shall at present only add a few general observations, which may not be improper in this place, where the skill of the orator in addressing to them is more especially required.

The orator will observe what circumstances either of things, or persons, or both, will furnish him with motives proper to apply to those passions he desires to excite in the minds of his hearers. Thus Cicero, in his orations for Plancus and Sylla, moves his hearers from the circumstances of the men; but in his accusation of Verres, very frequently from the barbarity and horrid nature of his crimes; and from both, in his defence of Quintius.

But the same passion may be excited by very different methods. This is plain from the writings of those Roman satyrists which are yet extant; for they have all the same design, and that is to engage men to a love of virtue, and hatred of vice: but their manner is very different, suited to the genius of each writer. Horace endeavours to recommend virtue, by laughing vice out of countenance; Persius moves us to an abhorrence and detestation of vice, with the gravity and severity of a philosopher; and Juvenal, by open and vehement invectives. So orators make use of all these methods in exciting the passions; as may be seen by their discourses, and particularly those of Cicero. But it is not convenient to dwell long upon the same passion. For the image thus wrought up in the minds of the hearers, does not last a great while, but they soon return to reflection. When the emotion therefore is once carried as high as it well can be, they should be left under its influence, and the speaker proceed to some new matter, before it declines again.

Moreover, orators sometimes endeavour to raise contrary passions to each other, as they are concerned for opposite parties. So the accuser excites anger and resentment, but the defendant pity and compassion. At other times, one thinks it sufficient to allay and take off that passion which the other has raised, and bring the hearers to a calm and sedate consideration of the matter before them.

But this especially is to be regarded, that the orator express the same passion himself with which he endeavours to affect others; and that not only in his action and voice, but likewise in his language: and therefore his words, and manner of expression, should be suited to that perturbation and disorder of mind which he designs to represent. However, a decency and propriety of character is always carefully to be observed; for, as Cicero very well remarks, "A neglect of this is not only very culpable in life, but likewise in discourse. Nor do the same things equally become every speaker, or every audience; nor every time, and every place." And therefore he greatly commends that painter, who, designing to represent in a picture the sacrifice of Iphigenia, Agamemnon's daughter, drew Calchas the priest with a sad countenance; Ulysses, her father's great friend, more dejected; and her uncle Menelaus, most disconsolate; but

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but threw a veil over the face of Agamemnon himself, as being unable to express that excess of sorrow which he thought was proper to appear in his countenance. And this justness of character is admirably well observed by Cicero himself, in his defence of Milo; for as Milo was always known to be a man of the greatest resolution, and most undaunted courage, it was very improper to introduce him (as the usual method then was in capital cases) moving pity, and begging for mercy. Cicero therefore takes this part upon himself; and what he could not do with any propriety in the person of Milo, he performs in his own, and thus addresses the judges: "What remains, but that I intreat and beseech you, that you would shew that compassion to this brave man, for which he himself does not solicit, but I, against his inclination, earnestly implore and request. Do not be less inclined to acquit him, if in this our common sorrow you see no tear fall from Milo's eyes; but perceive in him the same countenance, voice, and language, as at other times, steady and unmoved. Nay, I know not whether for this reason you ought not much sooner to favour him: For if, in the contests of gladiators, (persons of the lowest condition and fortune in life), we are wont to be displeased with the timorous and suppliant, and those who beg for their life; but interpose in favour of the brave and courageous, and such as expose themselves to death; and we shew more compassion to those who do not sue for it, than to those who do: with how much greater reason ought we to act in the same manner towards the bravest of our fellow-citizens?" And as these words were agreeable to his own character, while soliciting in behalf of another; so, immediately after, he introduces Milo speaking like himself, with a generous and undaunted air: "These words of Milo (says he) quite sink and dispirit me, which I daily hear from him. Farewel, farewell, my fellow-citizens, farewell may you be happy, flourish, and prosper; with this renowned city be preferred, my most dear country, however it has treated me; may it continue in peace, though I cannot continue in it, to whom it owes its peace. I will retire; I will be gone."

But as persons are commonly more affected with what they see than what they hear, orators sometimes call in the assistance of that sense in moving the passions. For this reason it was usual among the Romans, in judicial cases, for accused persons to appear with a dejected air and a sordid garb, attended by their parents, children, or other relations and friends, with the like dress and aspect; as likewise to shew their fears, wounds, bloody garments, and other things of the like nature, in open court. So when, upon the death of Cæsar, Mark Antony harangued the populace, he at the same time exposed to their view the garment in which he was stabbed, fixed upon a pole; at which sight they were so enraged, that immediately they ran with lighted torches to set fire to the houses of the conspirators. But this custom at last became so common, and was sometimes so ill conducted, that the force of it was greatly abated, as we learn from Quintilian. However, if the Romans proceeded to an excess on the one hand, the strictness of the Areopagites at Athens may perhaps be thought too rigid on the other; for in that court, if the orator began to

say any thing which was moving, an officer immediately stood up, and bade him be silent. There is certainly a medium between these two extremes, which is sometimes not only useful, but even necessary: for, as Quintilian very justly says, "It is necessary to apply to the passions, when those things which are true, just, and of common benefit, cannot be come at any other way."

CHAP. VII. Of Digression, Transition, and Amplification.

THE number, order, and nature of the parts which constitute a complete and regular oration, we have endeavoured to explain in several preceding chapters. But there are two or three things yet remaining, very necessary to be known by an orator, which seem most properly to come under the second branch of his art.—And these are, *Digression*, *Transition*, and *Amplification*.

1. *Digression*, as defined by Quintilian, is, "A going off from the subject we are upon to some different thing, which may however be of service to it." We have a very beautiful instance of this in Cicero's defence of Cælius, who was accused of having first borrowed money of Clodia, and then engaging her servants to poison her. Now, as the proof of the fact depended upon several circumstances, the orator examines them separately; and shews them to be all highly improbable. "How," says he, "was the design of this poison laid? Whence came it? how did they get it? by whose assistance, to whom, or where, was it delivered?" Now to the first of these queries he makes the accuser give this answer: "They say Cælius had it at home, and tried the force of it upon a slave provided on purpose, whose sudden death proved the strength of the poison." Now as Cicero represents the whole charge against Cælius as a fiction of Clodia, invented out of revenge for some slight he had put upon her; to make this the more probable, he insinuates that she had poisoned her husband, and takes this opportunity to hint it, that he might shew how easy it was for her to charge another with poisoning a servant, who had done the same to her own husband. But not contented with this, he steps out of his way, and introduces some of the last words of her husband Metellus, to render the fact more barbarous and shocking, from the admirable character of the man. "O immortal gods! why do you sometimes wink at the greatest crimes of mankind, or delay the punishment of them to futurity? For I saw, I myself saw (and it was the most doleful scene of my whole life) when Q. Metellus was taken from the bosom of his country; and when he, who thought himself born to be serviceable to this state, within three days after he had appeared with such advantage in the senate, in the forum, and every where in public, was snatched from us in the flower of his age, and prime of his strength and vigour. At which time, when he was about to expire, and his mind had lost the sense of other things, still retaining a concern for the public, he looked upon me, as I was all in tears, and intimated in broken and dying words, how great a storm hung over the city and threatened the whole state; often striking the wall which separated his house from that of Quintus Catulus, and frequently

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calling both upon him and me, and seeming to grieve not so much at the approach of his own death, as that both his country and I should be deprived of his assistance. Had he not been wickedly taken off on a sudden, how would he after his consulship have withstood the fury of his kinsman Publius Clodius, who, while in that office, threatened, in the hearing of the senate, to kill him with his own hand, when he first began to break out. And will this woman dare to come out of those doors, and talk of the force of poison? will not the fear, left the house itself should speak the villany? will not the dread the conscious walls, nor that sad and mournful night? But I return to the accusation." And then he proceeds to consider and refute the several circumstances of the accusation. All this was no part of his argument; but having mentioned the charge of poison, he immediately takes occasion to introduce it, in order to excite the indignation of the hearers against Clodia, and invalidate the prosecution as coming from a person of her character. Digression cannot properly be said to be a necessary part of a discourse; but it may sometimes be very convenient, and that upon several accounts.

As first, where a subject is of itself flat and dry, or requires close attention, it is of use to relieve and unbind the mind by something agreeable and entertaining. For which reason Quintilian observes, that the orators of his time generally made an excursion in their harangues upon some pleasing topic, between the narration and the proof. But he condemns the practice, as too general; for while they seemed to think it necessary, it obliged them sometimes to bring in things trifling and foreign to the purpose. Besides, a digression is confined to no one part of a discourse, but may come in any where, as occasion offers; provided it fall in naturally with the subject, and be made some way subservient to it. We never meet with it in Cicero, without some evident and good reason. So in his prosecution of Verres for his barbarous and inhuman outrages against the Sicilians, he takes an occasion to launch out in a beautiful description of the island, and to recount the advantages which accrued from it to the Romans. His subject did not necessarily lead him to this, but his view in it was to heighten and aggravate the charge against Verres.

Again, as a digression ought not to be made without sufficient reason, so neither should it be too frequent. And he who never does it but where it is proper and useful, will not often see occasion for it. Frequently to leave the subject, and go off to other things, breaks the thread of the discourse, and is apt to introduce confusion. Indeed some kinds of writing admit of a more frequent use of digressions than others. In history they are often very serviceable. For as that consists of a series of facts, and a long continued narrative without variety is apt to grow dull and tedious; it is necessary at proper distances to throw in something entertaining, in order to enliven it, and keep up the attention. And accordingly we find the best historians often embellish their writings with descriptions of cities, rivers, and countries, as likewise with the speeches of eminent persons upon important occasions, and other ornaments, to render them the more pleasing and delightful. Poets take a still greater liberty in this respect: for as their principal

view is most commonly to please, they do not attend so closely to connection; but as an image offers itself, which may be agreeably wrought up, they bring it in, and go off more frequently to different things, than others writers.

Another property of a digression is, that it ought not to be too long, lest the hearers forget what preceded, before the speaker returns again to his subject.

For a digression being no principal part of a discourse, nor of any further use than as it serves some way or other to enforce or illustrate the main subject; it cannot answer this end, if it be carried to such a length, as to cause that either to be forgotten, or neglected. And every one's memory will not serve him to connect together two parts of a discourse, which lie at a wide distance from each other. The better therefore to guard against this, it is not unusual with orators, before they enter upon a digression of any considerable length, to prepare their hearers, by giving them notice of it, and sometimes desiring leave to divert a little from the subject. And so likewise at the conclusion they introduce the subject again by a short transition. Thus Cicero in the example cited above, when he has finished his digression concerning the death of Metellus, proceeds to his subject again with these words: "But I return to the accusation."

Indeed we find orators sometimes, when fore pressed, and the cause will not bear a close scrutiny, artfully run into digressions with a design to divert the attention of the hearers from the subject, and turn them to a different view. And in such cases, as they endeavour to be unobserved, so they do it tacitly without any transition or intimation of their design; their business being only to get clear of a difficulty, till they have an opportunity of entering upon some fresh topic.

II. *Transitions* are often used not only after a digression, but likewise upon other occasions. A transition is, "A form of speech, by which the speaker in a few words tells his hearers both what he has said already, and what he next designs to say." Where a discourse consists of several parts, this is often very proper in passing from one to another, especially when the parts are of a considerable length; for it assists the hearers to carry on the series of the discourse in their mind, which is a great advantage to the memory. It is likewise a great relief to the attention, to be told when an argument is finished, and what is to be expected next. And therefore we meet with it very frequently in history. But we consider it at present only as made use of by orators. Cicero, in his second oration against Catiline, who had then left Rome, having at large described his conduct and designs, he adds: "But why do I talk so long concerning one enemy, and such an one; who owns himself an enemy, and whom I do not fear, since, what I always desired, there is now a wall between us; and says nothing of those, who conceal themselves, who remain at Rome, and among us." And then he proceeds to give an account of the other conspirators.

But sometimes, in passing from one thing to another, a general hint of it is thought sufficient to prepare the hearers, without particularly specifying what has been said, or is next to follow. Thus Cicero in his second Philippic says: "But those things are old,

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III. The third and last head is, *Amplification*. Now by amplification is meant, not barely a method of enlarging upon a thing, but so to represent it in the fullest and most comprehensive view, as that it may in the liveliest manner strike the mind, and influence the passions. Cicero speaking of this, calls it *the greatest commendation of eloquence*; and observes, "that it consists not only in magnifying and heightening a thing, but likewise in extenuating and lessening it." But though it consists of these two parts, and may be applied either way; yet to amplify, is not to set things in a false light, but to paint them in their just proportion and proper colours, suitable to their nature and qualities. Rhetoricians have observed several ways of doing this.

One is to ascend from a particular thing to a general. Thus Cicero, in his defence of Archias, having commended him as an excellent poet, and likewise observed, that all the liberal arts have a connection with each other, and a mutual relation between them, in order to raise a just esteem of him in the minds of his hearers, takes occasion to say many things in praise of polite literature in general, and the great advantages that may be received from it. "You will ask me," says he, "why we are so delighted with this man? Because he supplies us with those things, which both refresh our minds after the noise of the forum, and delight our ears when wearied with contention. Do you think we could either be furnished with matter for such a variety of subjects, if we did not cultivate our minds with learning; or bear such a constant fatigue, without affording them that refreshment? I own I have always pursued these studies; let those be ashamed, who have so given up themselves to learning, as neither to be able to convert it to any common benefit, nor discover it in public. But why should it shame me, who have so lived for many years, that no advantage or ease has ever diverted me, no pleasure allured me, nor sleep retarded me, from this pursuit. Who then can blame me, or who can justly be displeased with me, if I have employed that time in reviewing these studies, which has been spent by others in managing their affairs, in the celebration of festivals, or other diversions, in refreshments of mind and body, in unseasonable banquets, in dice, or tennis? And this ought the rather to be allowed me, because my ability as an orator has been improved by those pursuits, which, such as it is, was never wanting to assist my friends. And if it be esteemed but small, yet I am sensible from what spring I must draw those things, which are of the greatest importance." With more to the same purpose; from which he draws this inference: "Shall I not therefore love this man? Shall I not admire him? Shall I not by all means defend him?"

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Disposition A contrary method to the former is, to descend from a general to a particular. As if any one, while speaking in commendation of eloquence, should illustrate what he says from the example of Cicero, and shew the great services he did his country, and the honours he gained to himself, by his admirable skill in oratory. Our common way of judging of the nature of things is from what we observe in particular instances, by which we form general notions concerning them. When therefore we consider the character of Cicero, and the figure he made in the world, it leads us to conclude, there must be something very admirable in that art by which he became so celebrated. And this method he has taken himself in his oration for the Manilian law, where having first intimated the scarcity of good generals at that time among the Romans, he then describes the virtues of a complete commander as a proof of it, and shews how many and great qualifications are necessary to form such a character, as courage, prudence, experience, and success; all which he afterwards applies to Pompey.

A third method is by an enumeration of parts. So when Cicero, upon the defeat of Mark Antony before Mutina, proposed that a funeral monument should be erected in honour of the soldiers who were killed in that battle, as a comfort to their surviving relations; he does it in this way, to give it the greater weight: "Since (says he) the tribute of glory is paid to the best and most valiant citizens by the honour of a monument, let us thus comfort their relations, who will receive the greatest consolation in this manner: their parents, who produced such brave defenders of the state; their children, who will enjoy these domestic examples of fortitude; their wives, for the loss of such husbands, whom it will be more fitting to extol than lament; their brethren, who will hope to resemble them no less in their virtues, than their aspect. And I wish we may be able to remove the grief of all these by our resolutions." Such representations greatly enlarge the image of a thing, and afford the mind a much clearer view of it than if it were contracted into one single proposition.

Again, another method not much unlike the former is, when any thing is illustrated from a variety of causes. Thus Cicero justifies his behaviour in retiring, and not opposing his enemies, when they spirited up the mob in order to banish him, from the following reasons, which at that time determined him to such a conduct: "When (says he) unless I was given up, so many armed fleets seemed ready to attack this single ship of the state, tossed with the tempests of seditions and discords, and the senate was now removed from the helm; when banishment, murder, and outrage, were threatened; when some, from an apprehension of their own danger, would not defend me; others were incited by an inveterate hatred to all good men, others thought I stood in their way, others took this opportunity to express their resentment, others envied the peace and tranquillity of the state; and upon all these accounts I was particularly struck at: should I have chosen rather to oppose them, (I will not say to my own certain destruction, but to the greatest danger both of you and your children), than alone to submit to and undergo what threatened us all in common?"

Such a number of reasons brought together, must set a

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Disposition

thing in a very strong and clear light.

The like may be said of a number and variety of effects. Thus Cicero describes the force and excellence of oratory from its great and surprising effects, when he says, "Nothing seems to me more excellent, than by discourse to draw the attention of a whole assembly, delight them, and sway their inclinations different ways at pleasure. This, in every free state, and especially in times of peace and tranquillity, has been always in the highest esteem and reputation. For what is either so admirable, as for one only, or a very few, out of a vast multitude, to be able to do that which all have a natural power of doing? or so delightful to hear, as a judicious and solid discourse in florid and polite language? or so powerful and grand, as to influence the populace, the judges, the senate, by the charms of eloquence? Nay, what is so noble, so generous, so munificent, as to afford aid to supplicants, to support the afflicted, give safety, deliver from dangers, and preserve from exile? Or what is so necessary as to be always furnished with arms to guard yourself, assert your right, or repel injuries? And, not to confine our thoughts wholly to the courts of justice or the senate, what is there in the arts of peace more agreeable and entertaining than good language and a fine way of speaking? For it is this especially wherein we excel other animals, that we can discourse together, and convey our thoughts to each other by words. Who therefore would not esteem, and in a particular manner endeavour to surpass others in that wherein mankind principally excels brute beasts? But to proceed to its chief advantages: What else would have drawn men into societies, or taken them off from a wild and savage life, and soften them into a polite and civilized behaviour; or, when settled in communities, have restrained them by laws?" Who but, after such a description, must conceive the strongest passion for an art attended with so many great and good effects?

A thing may likewise be illustrated by its opposite. So the blessings and advantages of peace may be recommended from the miseries and calamities of war; and thus Cicero endeavours to throw contempt upon Catiline and his party, by comparing them with the contrary side: "But if, omitting all these things with which we abound, and they want, the senate, the knights, the populace, the city, treasury, revenues, all Italy, the provinces, and foreign nations; if, I say,

omitting these things, we compare the causes themselves in which each side is engaged, we may learn from thence how despicable they are.—For on this side modesty is engaged, on that impudence; on this chastity, on that lewdness; on this integrity, on that fraud; on this piety, on that profaneness; on this constancy, on that fury; on this honour, on that baseness; on this moderation, on that unbridled passion: In a word, equity, temperance, fortitude, prudence, and all virtues, contend with injustice, luxury, cowardice, rashness, and all vices; plenty with want; reason with folly; sobriety with madness; and, lastly, good hope with despair. In such a contest, did men desert us, would not heaven ordain that so many and so great vices should be defeated by these most excellent virtues?"

Gradation is another beautiful way of doing this. So when Cicero would aggravate the cruelty and barbarity of Verres for crucifying a Roman citizen, which was a sort of punishment only inflicted upon slaves, he chooses this way of doing it. "It is a crime (says he) to bind a Roman citizen, wickedness to whip him, and a sort of parricide to kill him; what then must I call it to crucify him? No name can sufficiently express such a villany." And the images of things may be thus heightened, either by ascending, as in this instance; or descending, as in that which follows, relating to the same action of Verres: "Was I not to complain of or bewail these things to Roman citizens, nor the friends of our state, nor those who had heard of the Roman name; nay, if not to men, but beasts; or, to go yet further, if in the most desert wilderness to stones and rocks; even all mute and inanimate creatures would be moved by so great and heinous cruelty."

And, to name no more, facts may be amplified from their circumstances; as time, place, manner, event, and the like. But instances of this would carry us too far; and therefore we shall only add, that, as the design of *amplification* is not barely to prove or evince the truth of things, but also to adorn and illustrate them, it requires a florid and beautiful style, consisting of strong and emphatical words, flowing periods, harmonious numbers, lively tropes, and bright figures. But the consideration of these things come under the third part of oratory, upon which we are now to enter.

PART III. OF ELOCUTION.

ELOCUTION directs us to suit both the words and expressions of a discourse to the nature of the subject, or to speak with propriety and decency. This faculty is in one word called *eloquence*; and those persons who are possessed of it are therefore styled *eloquent*.

Elocution is twofold; general, and particular. The former treats of the several properties and ornaments of language in common; the latter considers them as they are made use of to form different sorts of style.

I. GENERAL ELOCUTION.

THIS, according to rhetoricians, consists of three

parts; *Elegance, Composition, and Dignity*. A discourse which has all these properties suitably adjusted, must, with respect to the language, be perfect in its kind, and delightful to the hearers.

CHAP. I. Of Elegance.

ELEGANCE consists in two things; *Purity, and Perspicuity*: And both these, as well with respect to single words, as their construction in sentences. These properties in language give it the name of *elegant*, for a like reason that we call other things so which are clean and neat in their kind. But in the common use of our tongue, we are apt to confound *elegance* with *eloquence*; and say, *a discourse is elegant*, when we mean

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eloquent. by the expression, that it has all the properties of fine language.

§ 1. Purity.

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By this we are to understand the choice of such words and phrases as are suited and agreeable to the use of the language in which we speak: And so grammarians reduce the faults they oppose to it to two sorts, which they call *barbarism* and *solecism*; the former of which respects single words, and the latter their construction. But we shall consider them jointly, and in a manner different from grammarians; for with them all words are esteemed pure, which are once adopted into a language, and authorised by use. And as to phrases, or forms of expression, they allow them all the same claim, which are agreeable to the analogy of the tongue. But in oratory, neither all words nor all expressions are so called, which occur in language; but such only as come recommended by the authority of those who speak or write with accuracy and politeness. Indeed it is a common saying, *that we should think with the learned, and speak with the vulgar*. But the meaning of that expression is no more than that we should speak agreeably to the common usage of the tongue, that every one may understand us; and not choose such words or expressions as are either difficult to be understood, or may carry in them an appearance of affectation and singularity. But in order to set this matter in a clearer light, we shall here recount the principal things which vitiate the purity of language.

And first, it often happens, that such words and forms of speaking as were introduced by the learned, are afterwards dropped by them as mean and sordid, from a seeming baseness contracted by vulgar use. For polite and elegant speakers distinguish themselves by their discourse, as persons of figure do by their garb; one being the dress of the mind, as the other is of the body. And hence it comes to pass, that both have their different fashions, which are often changed; and as the vulgar affect to imitate those above them in both, this frequently occasions an alteration when either becomes too trite and common. But beside these sordid words and expressions, which are rendered so by the use of the vulgar; there is another sort first introduced by them, which is carefully to be avoided by all those who are desirous to speak well. For the vulgar have their peculiar words and phrases, suited to their circumstances, and taken from such things as usually occur in their way of life. Thus in the old comedians, many things are spoken by servants, agreeable to their character, which would be very unbecoming from the mouth of a gentleman. And we cannot but daily observe the like instances among ourselves.

Again, this is common to language with all other human productions, that it is in its own nature liable to a constant change and alteration. For, as Horace has justly observed,

All human works shall waste,
Then how can feeble words pretend to last?

Nothing could ever please all persons, or at least for any length of time. And there is nothing from which this can less be expected than language. For as the thoughts of men are exceedingly various, and words

are the signs of their thoughts; they will be constantly inventing new signs to express them by, in order to convey their ideas with more clearness, or greater beauty. If we look into the different ages of the Latin writers, what great alterations and changes do we find in their language? How few now understand the remaining fragments of the *twelve tables*? Nay, how many words do we meet with even in Plautus, the meaning of which has not yet been fixed with certainty by the skill of the best critics? And if we consider our own language, it will appear to have been in a manner entirely changed from what it was a few ages since. To mention no others, our celebrated Chaucer is to most persons now almost unintelligible, and wants an expositor. And even since our own memory, we cannot but have observed, that many words and expressions, which a few years ago were in common use, are now in a manner laid aside and antiquated; and that others have constantly succeeded, and daily do succeed, in their room. So true is that observation of the same poet:

Some words that have or else will feel decay,
Shall be reformed, and come again in play;
And words now fam'd, shall not be fancied long,
They shall not please the ear, nor move the tongue:
As use shall these approve, and those condemn;
Use, the sole rule of speech, and judge supreme.

We must therefore no less abstain from antiquated or obsolete words and phrases, than from sordid ones. Though all old words are not to be thought antiquated. By the former we mean such as, though of an ancient standing, are not yet entirely disused, nor their signification lost. And from the use of these we are not to be wholly debarred, especially when they appear more significant than any others we can fix upon. But as to phrases or expressions, greater caution seems still necessary; and such as are old, should doubtless, if at all, be used more sparingly. The Latin tongue was brought to its greatest perfection in the reign of Augustus, or somewhat sooner; and he himself studied it very carefully. For, as Suetonius tells us, "He applied himself to eloquence, and the study of the liberal arts, from his childhood, with great diligence and labour. He chose a manner of speaking which was smooth and elegant: he avoided the ill favour, as he used to call it, of antiquated words; and he was wont to blame Tiberius for his affectation of them." In our own language, such words are to be esteemed antiquated, which the most polite persons have dropped, both in their discourse and writings; whose example we should follow, unless we would be thought to converse rather with the dead than the living.

But further: As on the one hand we must avoid obsolete words and phrases; so on the other, we should refrain from new ones, or such whose use has not been yet been sufficiently established, at least among those of the best taste. Words may be considered as new in two respects; either when they are first brought into a language, or when they are used in a new sense. As the former of these may sometimes leave us in the dark by not being understood, so the latter are most apt to mislead us; for when we hear a word that has been familiar to us, we are presently led to fix that idea to it with which it has usually been attended.

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And therefore, in both cases, some previous intimation may be necessary. Cicero, who perhaps enlarged the furniture of the Roman tongue more than any one person besides, appears always very cautious how he introduces any thing new, and generally gives notice of it when he attempts it, as appears in many instances scattered through his works. What bounds we are now to fix to the purity of the Latin tongue in the use of it, the learned are not well agreed. It is certain, our furniture is much less than when it was a living language, and therefore the greater liberty must of necessity be sometimes taken. So that their opinion seems not unadvisable, who direct us to make choice principally of what we are furnished with from the writers of the Augustan age; and, where we cannot be supplied from them, to make use of such authors as lived nearest to them, either before or since. And as to our own tongue, it is certainly prudent to be as careful how we admit any thing into it that is uncouth or disagreeable to its genius; as the ancient Romans were into theirs; for the perfection of a language does in a great measure consist in a certain analogy, and harmony running through the whole, by which it may be capable of being brought to a standard.

But besides those things already mentioned, any mistake in the sense of words, or their construction, is opposed to purity. For to speak purely, is to speak correctly. And such is the nature of these faults in elocution, that they are often not so easy to be observed by hearing as by reading. Whence it is, that many persons are thought to speak better than they write; for while they are speaking, many slips and inaccuracies escape disregarded, which in reading would presently appear. And this is more especially the case of persons unacquainted with arts and literature; who, by the assistance of a lively fancy and flow of words, often speak with great ease and freedom, and by that means please the ear; when, at the same time, what they say, would not so well bear reading.

We shall only add, that a distinction ought likewise to be made between a poetic diction, and that of prose writers. For poets in all languages have a sort of peculiar dialect, and take greater liberties, not only in their figures, but also in their choice and disposition of words; so that what is a beauty in them would often appear unnatural and affected in prose.

§ 2. Of Perspicuity.

PERSPICUITY, as well as purity, consists partly in single words, and partly in their construction.

1. As to single words, those are generally clearest and best understood which are used in their proper sense. But it requires no small attention and skill to be well acquainted with the force and propriety of words; which ought to be duly regarded, since the perspicuity of a discourse depends so much upon it. Cæsar seems plainly to have been of this mind, when he tells us, "The foundation of eloquence consists in the choice of words." It may not be amiss, therefore, to lay down some few observations, by which the distinct notions of words and their peculiar force may more easily be perceived. All words may be divided into proper words and tropes. Those are called proper words, which are expressed in their proper and usual

sense. And tropes are such words as are applied to some other thing than what they properly denote, by reason of some similitude, relation, or contrariety between the two things. So, when a subtle artful man is called a fox, the reason of the name is founded in a similitude of qualities. If we say, Cicero will always live, meaning his works, the cause is transferred to the effect. And when we are told, Cæsar conquered the Gauls, we understand that he did it with the assistance of his army; where a part is put for the whole, from the relation between them. And when Cicero calls Anthony a fine guardian of the state, every one perceives he means the contrary. But the nature and use of tropes will be explained more fully hereafter in their proper place. All words must at first have had one original and primary signification, which, strictly speaking, may be called their proper sense. But it sometimes happens through length of time, that words lose their original signification, and assume a new one, which then becomes their proper sense. So hostis in the Latin tongue at first signified a stranger; but afterwards that sense of the word was entirely laid aside, and it was used to denote a public enemy. And in our language, it is well known, that the word knave anciently signified a servant. The reason of the change seems to be much the same, as in that of the Latin word latro; which first signified a soldier; but afterwards a robber. Besides, in all languages it has frequently happened, that many words have gradually varied from their first sense to others somewhat different; which may, notwithstanding, all of them, when rightly applied, be looked upon as proper. Nay, in process of time, it is often difficult to say which is the original, or most proper sense. Again, sometimes two or more words may appear to have the same signification with each other, and may therefore be used indifferently; unless the beauty of the period, or some other particular reason, determine to the choice of one rather than another. Of this kind are the words ensis and gladius in the Latin tongue; and in ours, pity and compassion. And there are other words of so near an affinity to each other, or at least appear so from vulgar use, that they are commonly thought to be synonymous. Such are the words mercy and pity; tho' mercy in its strict sense is exercised towards an offender, and pity respects one in distress. As this peculiar force and distinction of words is carefully to be attended to, so it may be known several ways. Thus the proper signification of substantives may be seen by their application to other substantives. As in the instance just now given, a person is said to shew mercy to a criminal, and pity to one in distress. And in the like manner verbs are distinguished, by being joined to some certain nouns, and not to others. So a person is said to command an inferior, to treat a superior, and to desire an equal. Adjectives also, which denote the properties of things, have their signification determined by those subjects to which they most properly relate. Thus we say, an honest mind, and a healthful body; a wise man, and a fine house. Another way of distinguishing the propriety of words, is by their use in gradations. As if one should say, Hairred, grudges, quarrels, tumults, seditions, wars, spring from unbridled passions. The proper sense of words may likewise be known by observing to what other words

locution.

words are either opposed, or used as equivalent. So in that passage of Cicero, where he says, "I cannot perceive why you should be angry with me: If it be because I defend him whom you accuse, why may not I be displeased with you for accusing him whom I defend? You say, I accuse my enemy; and I say, I defend my friend." Here the words *accuse* and *defend*, *friend* and *enemy*, are opposed; and *to be angry* and *displeased*, are used as terms equivalent. Lastly, the derivation of words, contributes very much to determine their true meaning. Thus because the word *manners* comes from the word *man*, it may properly be applied either to that, or any other put for it. And therefore we say, *the manners of men*, and *the manners of the age*; because the word *age* is there used for *the men of the age*. But if we apply the word *manners* to any other animal, it is a trope. By these, and such like observations, we may perceive the proper sense and peculiar force of words, either by their connection with other words, distinction from them, opposition to them, equivalency with them, or derivation. And by thus fixing their true and genuine signification we shall easily see when they become tropes. But though words, when taken in their proper signification, generally convey the plainest and clearest sense; yet some are more forcible, sonorous, or beautiful than others. And by these considerations we must often be determined in our choice of them. So whether we say, *he got*, or *he obtained*, the victory, the sense is the same; but the latter is more full and sonorous. In Latin, *timeo* signifies *I fear*; *pertimesco* is more full and significant, and *pertimesco* more sonorous than either of the former. The Latin and Greek languages have much the advantage of ours in this respect, by reason of their compositions; by the help of which they can often express that in one word, for which we are obliged to put two words, and sometimes more. So *pertimesco* cannot be fully expressed in our language by one word; but we are forced to join one or two particles to the verb, to convey its just idea, and say, *I greatly*, or *very much fear*: and yet even then, we scarce seem to reach its full force. As to tropes, tho' generally speaking they are not to be chosen where plainness and perspicuity of expression is only designed, and proper words may be found; yet through the penury of all languages, the use of them is often made necessary. And some of them, especially metaphors, which are taken from the similitude of things, may, when custom has rendered them familiar, be considered as proper words, and used in their stead. Thus, whether we say, *I see your meaning*, or, *I understand your meaning*, the sense is equally clear, tho' the latter expression is proper, and the former metaphorical, by which the action of seeing is transferred from the eyes to the mind.

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11. But *perspicuity* arises not only from a choice of *single words*, but likewise from the *construction* of them in sentences. For the meaning of all the words in a sentence, considered by themselves, may be very plain and evident; and yet, by reason of a disorderly placing them, or confusion of the parts, the sense of the whole may be very dark and obscure. Now it is certain, that the most natural order is the plainest; that is, when both the words and parts of a sentence are so disposed, as best agrees with their mu-

tual relation and dependence upon each other. And

locution.

where this is changed, as is usually done, especially in the ancient languages, for the greater beauty and harmony of the periods; yet due regard is had by the best writers to the evidence and perspicuity of the expression.

But to set this subject in a clearer light, on which the perfection of language so much depends, we shall mention some few things which chiefly occasion obscurity; and this either with respect to single words, or their construction.

And first, all ambiguity of expression is one cause of obscurity. This sometimes arises from the different senses in which a word is capable of being taken. So we are told, that upon Cicero's addressing himself to Octavius Cæsar, when he thought himself in danger from his resentment, and reminding him of the many services he had done him, Octavius replied, *He came the last of his friends*. But there was a designed ambiguity in the word *last*, as it might either respect the time of his coming, or the opinion he had of his friendship. And this use of ambiguous words we sometimes meet with, not only in poetry, where the turn and wit of an epigram often rests upon it; but likewise in prose, either for pleasantry or ridicule. Thus Cicero calls Sextus Clodius, *the light of the senate*; which is a compliment he pays to several great men, who had distinguished themselves by their public services to their country. But Sextus, who had a contrary character, was a relation of P. Clodius, whose dead body, after he had been killed by Milo, he carried in a tumultuous manner into the senate-house, and there burnt it with the senators benches, in order to inflame the populace against Milo. And it is in allusion to that riotous action, that Cicero, using this ambiguous expression, calls him *the light of the senate*. In such instances, therefore, it is a beauty, and not the fault we are cautioning against; as the same thing may be either good or bad, as it is differently applied. Tho' even in such designed ambiguities, where one sense is aimed at, it ought to be sufficiently plain, otherwise they lose their intention. And in all serious discourses they ought carefully to be avoided. But obscurity more frequently arises from the ambiguous construction of words, which renders it difficult to determine in what sense they are to be taken. Quintilian gives us this example of it: "A certain man ordered in his will, that his heir should erect for him a statue holding a spear made of gold." A question arises here, of great consequence to the heir from the ambiguity of the expression, whether the words *made of gold*, are to be applied to the *statue* or the *spear*; that is, whether it was the design of the testator by this appointment, that the whole statue, or only the spear, should be made of gold. A small note of distinction, differently placed between the parts of this sentence, would clear up the doubt, and determine the sense either way. For if one comma be put after the word *statue*, and another after *spear*, the words *made of gold* must be referred to the statue, as if it had been said, *a statue, made of gold, holding a spear*. But if there be only the first comma placed after *statue*, it will limit the words *made of gold* to the *spear* only; in the same sense as if it had been said, *A statue holding a golden spear*. And either of these ways of expression would

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in this case have been preferable, for avoiding the ambiguity, according to the intention of the testator. The ancient heathen oracles were generally delivered in such ambiguous terms. Which, without doubt, were so contrived on purpose, that those who gave out the answers might have room left for an evasion.

Again, obscurity is occasioned either by too short and concise a manner of speaking, or by sentences too long and prolix; either of these extremes have sometimes this bad consequence. We find an instance of the former in Pliny the elder, where, speaking of helibore, he says, "They forbid it to be given to aged persons and children, and less to women than men." The verb is wanting in the latter part of the sentence, and *less to women than men*: which in such cases being usually supplied from what went before, would here stand thus; and *they forbid it to be given less to women than men*. But this is directly contrary to the sense of the writer, whose meaning is, either that it is ordered to given in a less quantity to women than men, or not so frequently to women as men. And therefore the word *order* is here to be supplied, which being of a contrary signification to *forbid*, expressed in the former part of the sentence, occasions the obscurity. That long periods are often attended with the same ill effect, must be so obvious to every one's experience, that it would be entirely needless to produce any examples in order to evince the truth of it. And therefore we shall only observe, that the best way of preventing this seems to be by dividing such sentences as exceed a proper length, into two or more; which may generally be done without much trouble.

Another cause of obscurity, not inferior to any yet mentioned, is *parenthesis*, when it is either too long or too frequent. This of Cicero, in his oration for Sylla, is longer than we usually find in him: "O immortal gods! (for I must attribute to you what is your own; nor indeed can I claim so much to my own abilities, as to have been able of myself to go through so many, so great, such different affairs, with that expedition, in that boisterous tempest of the state), you inflamed my mind with a desire to save my country." But where any obscurity arises from such sentences, they may frequently be remedied by much the same means as was just now hinted concerning long and prolix periods; that is, by separating the parenthesis from the rest of the sentence, and placing it either before or after. So in this sentence of Cicero, the parenthesis may stand last, in the following manner: "O immortal gods! you inflamed my mind with a desire to save my country: for I must attribute to you what is your own; nor indeed can I claim so much to my own abilities, as to have been able of myself to go through so many, so great, such different affairs, with that expedition, in that boisterous tempest of the state." This order of the sentence is very plain, and less involved than the former.

CHAP. II. Of Composition.

COMPOSITION, in the sense it is here used, gives rules for the structure of sentences, with the several members, words, and syllables, of which they consist, in such a manner as may best contribute to the force, beauty, and evidence of the whole.

Composition consists of four parts, which rhetori-

cians call *period*, *order*, *junction*, and *number*. The first of these treats on the structure of sentences; the second, of the parts of sentences, which are words and members; and the two last, of the parts of words, which are letters and syllables. For all articulate sounds, and even the most minute parts of language, come under the cognizance of oratory.

§ 1. Of Period.

IN every sentence or proposition, something is said of something. That of which something is said, logicians call the *subject*; and that which is said of it, the *predicate*: but in grammatical terms, the former is a *noun substantive of the nominative case*, and the latter a *finite verb*. These two parts may of themselves constitute a sentence: As when we say, *The sun shines*, or *The clock strikes*, the words *sun* and *clock* are the subject in these expressions, *shines* and *strikes* the predicate. But most commonly they are accompanied with other words, which in grammatical construction are said either to be connected with or to depend upon them; but in a logical consideration they denote some property or circumstance relating to them. As in the following sentence: *A good man loves virtue for itself*. The subject of this sentence is *a good man*; and the predicate, or thing affirmed of him, that *he loves virtue for itself*. But the two principal or necessary words, on which all the rest depend, are, *man* and *loves*. Now a simple sentence consists of one such noun and verb, with whatever else is joined to either or both of them. And a compound sentence contains two or more of them; and may be divided into so many distinct propositions, as there are such nouns and verbs, either expressed or understood. So in the following sentence, *Compliance gains friends, but truth procures hatred*, there are two members, each of which contains in it an entire proposition. For, *Compliance gains friends*, is one complete sentence; and, *Truth procures hatred*, is another; which are connected into one compound sentence by the particle *but*. Moreover, it frequently happens, that compound sentences are made up of such parts or members, some if not all of which are themselves compounded, and contain in them two or more simple members. Such is that of Sallust: "Ambition has betrayed many persons into deceit; to say one thing, and to mean another; to found friendship and enmity, not upon reason, but interest; and to be more careful to appear honest, than really to be so." This sentence consists of four members; the last of which three, consisting of opposite parts, are all compounded, as will appear by expressing them at length in the following manner: *Ambition has betrayed many persons into deceit; [that is, ambition] has betrayed them to say one thing, it and to mean another; it has betrayed them to found friendship and enmity, not upon reason, but interest; and it has betrayed them to be more careful to appear honest, than really to be so*. The three last of these members, beginning with the words *it betrays*, are all of them compounded, and consist of two opposite members; which might each of them be expressed at length in the same manner, by supplying the ellipsis. As, *Ambition has betrayed many persons to say one thing, and it has betrayed them to mean another*. And so of the rest. From this instance we see how much is left

Elocution. left to be supplied by the mind in all discourse, which if expressed would both destroy its harmony and render it exceedingly tedious. But still regard must be had to that which is omitted, so as to render what is said consistent with it; otherwise there can be no propriety in what is spoken. Nor can the members of a sentence be distinguished and duly ranged in their proper order, without this. But to proceed: Some sentences consist either wholly, or in part, of such members as contain in them two or more compound ones, which may therefore, for distinction's sake, be called *decompound members*. Of this kind is that of Cicero in his defence of Milo: "Great is the force of conscience, great either way: that those persons are not afraid who have committed no offence; and those who have offended, always think punishment present before their eyes." The latter member of this sentence, which begins with the word *that*, contains in it two compound members, which represent the different state of mind between innocent and guilty persons. And it is in the proper distinction, and separation of the members in such complex sentences, that the art of pointing chiefly consists. For the principal use of a comma is to divide the simple members, a semicolon the compound ones, a colon such as are decompounded, and a period the whole from the following sentence. We mention this the rather, to shew the different acceptation of these terms by grammarians, from that of the ancient writers upon oratory. For these latter apply them to the sense, and not to any points of distinction. A very short member, whether simple or compound, with them is a comma, and a longer a colon; for they have no such term as a semicolon. Besides, they call a very short sentence, whether simple or compound, a *comma*; and one of somewhat a greater length, a *colon*. And therefore, if a person expressed himself either of these ways in any considerable number of sentences together, he was to speak by commas or colons. But a sentence containing more words than will consist with either of these terms, they call a simple period; the least compound period with them requiring the length of two colons. However, this way of denominating sentences, and the parts of them, rather from their length than the nature of them, appearing not so suitable, we have chosen rather to make use of the terms *simple and compound members*; and to call all those *compound periods*, which contain two or more members, whether simple or compounded.

But to proceed: Sentences with respect to their form or composition, are distinguished into two sorts, called by Cicero *tractas*, "straight or direct;" and *contortas*, "bent or winding." By the former are meant those whose members follow each other in a direct order, without any inflection; and by the latter, those which strictly speaking are called *periods*. For *periodos* in Greek signifies a *circuit or circle*. And so the Latins call it *circuitus* and *ambitus*. By which both of them mean a sentence consisting of correspondent parts, so framed, that the voice in pronouncing them may have a proper elevation and cadency, and distinguish them by its inflexion; and as the latter part returns back, and unites with the former, the period, like a circle, surrounds and incloses the whole sense. This elevation of the voice in the former part of the

period, is by the Greeks called *anastrophe*, and by the Latins *propositio*; and the depression of it in the latter part, by the one *anabasis*, and by the other *reditio*.

Now as simple sentences have not these correspondent parts, which require any inflection of the voice; nor a circular form, by reason of their brevity; they are not properly periods, in the strict sense of the word: though in common speech, the words *sentence and period* are often used as equivalent terms. Thus, if we say, *Generous minds are incited to the performance of noble exploits from motives of glory*; here is no distinction of parts, nor inflexion of the voice in this sentence. And indeed there is not any thing which relates to the structure of these sentences, but what will more properly be taken notice of in the second part of *composition*, which is *order*.

And as to those compound sentences, whose members follow each other in a direct order, without any inflection, there is little art required in their composition. We shall produce one example of this kind from Cicero: "Natural reason inclines men to mutual converse and society; and implants in them a strong affection for those who spring from them; and excites them to form communities, and join in public assemblies; and, for these ends, to endeavour to procure both the necessities and conveniences of life; and that not for themselves only, but likewise their wives, children, and others who are dear to them, and have a right to their assistance." Here are five short members in this sentence, placed in a series, without any inflection of the parts, or orbit of the whole. And as such sentences have no other boundary but the conclusion of the sense, suited to the breath of the speaker, he may either contract or lengthen them at pleasure, without offending the ear. So, should the sentence last mentioned conclude with the first member in this manner, *Natural reason inclines men to mutual converse and society*; the sense would be perfect, and the ear satisfied. The case would be the same at the end of the second member, thus: *Natural reason inclines men to mutual converse and society, and implants in them a strong affection for those who spring from them*. And the like may be said of the rest. Since such sentences therefore may be thus limited at pleasure, it seems more convenient both for the speaker and hearers to confine them to a moderate length.

But because the principal art relating to this part of composition lies in the frame and structure of such compound sentences as are properly called *periods*, we shall treat upon these somewhat more largely. In the formation of these periods, two things are chiefly to be regarded; their *length*, and *cadency*. As the length ought to be suited to the breath of the speaker, the ancient rhetoricians scarce admit of more than four colons; by which we may here understand compound members of a moderate size, which will be generally found a suitable and proportionate length. For to extend them farther than the voice can well manage must be painful to the speaker, and of consequence unpleasant to the hearers. As to the cadency, what Cicero has observed, is found true by experience, that the ears judge what is full and what is deficient; and direct us to fill up our periods, that nothing be wanting, of what they expect. When the voice is raised

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at the beginning of a sentence, they are in suspense till it be finished; and are pleased with a full and just cadency, but are sensible of any defect, and are displeased with redundancy. Therefore care must be taken that periods be neither deficient, and as it were maimed, that is, that they do not drop before their time, and defraud the ears of what seemed to be promised them; nor, on the other hand, offend them by too long and immoderate excursions. This rise and cadency of the voice in pronunciation, depend on the nature and situation of the members, as we shall endeavour to shew by particular instances; in the explanation of which, by the word *members*, are to be understood such as are compounded. In a period of two members, the turn of the voice begins with the latter member. Of this kind is the following sentence of Cicero: "If impudence prevailed as much in the forum and courts of justice, as insolence does in the country and places of less resort; Aulus Cæcina would submit as much to the impudence of Sextus Ebutius in this cause, as he did before to his insolence when assaulted by him." Here the cadency begins at the words *Aulus Cæcina*. If a sentence consist of three members, the inflection is best made at the end of the second member: for if it begin immediately after the first, the voice will either be apt to sink too low, and not be heard, before it reach the end; or else be precipitated, in order to prevent it. Cicero begins his oration for Milo with a sentence of this form: "Although I fear, it may be a shame to be dismayed at the entrance of my discourse in defence of a most valiant man; and that it noways becomes me, while Milo is more concerned for the safety of the state than for himself, not to shew the same greatness of mind in his behalf: yet this new form of prosecution terrifies my eyes, which, whatever way they turn, want the ancient custom of the forum, and former manner of trials." Here the cadency beginning at the third member with the word *yet*, makes a proper division of the sentence, and easy for the speaker. But a period of four members is reckoned the most complete and perfect, where the inflection begins at the middle, that is, with the third member. Nor is it the same case here, as if, in a sentence of three members, the cadency be made at the second. For in proportion to the time of raising the voice, may the space be allowed for its sinking. The following sentence of Cicero gives us an instance of this, where he speaks to his son: "Although, son Mark, having now been an hearer of Cratippus for a year, and this at Athens, you ought to abound in the precepts and doctrines of philosophy, by reason of the great character both of your instructor and the city; one of which can furnish you with knowledge, and the other with examples: yet, as I always to my advantage joined the Latin tongue with the Greek, and have done it not only in oratory, but likewise in philosophy; I think you ought to do the same, that you may be equally conversant in both languages." The turn in this period begins at the word *yet*; which standing near the middle, the voice is raised to that pitch in pronouncing the former part, as to admit of a gradual cadency, without being lost before the conclusion of the sentence. But where the sense does not suit with this division at the entrance upon the third member, it is

best made at the fourth. Such is the following sentence of Cicero: "If I have any genius, which I am sensible how small it is; or any readiness in speaking, wherein I do not deny but I have been much conversant; or any skill in oratory, from an acquaintance with the best arts, to which I confess I have been always inclined: *no one* has a better right to demand of me the fruit of all these things, than this Aulus Læcinius." The cadency of this sentence does not begin till the words *no one*; yet it ends handsomely, and without disappointing the ear. Though indeed the three first members having each of them an inflection, check the elevation of the voice, and by that variety in the pronunciation add to the harmony of the sentence. An equality of the members should likewise be attended to in the composition of a period, the better to adjust their rise and cadency. And for this reason, in sentences of three members, where the cadency begins with the third; or in those of four members, where it begins at the fourth; it promotes the harmony to make the last member longest. This is properly the nature of rhetorical periods, which when rightly formed have both an equal beauty and dignity in their composition.

But as all discourse is made up of distinct sentences, and whenever we express our thoughts it is in some of the forms above-mentioned; so the use of them is not promiscuous, but suited to answer different designs in speaking. And in this view they are considered and made use of by the orator, as will be shewn hereafter.

§ 2. Of Order.

By *order*, rhetoricians mean the placing each word and member of a sentence in such a manner as will most contribute to the force, beauty, or evidence of the whole.

Order is of two kinds, *natural* and *artificial*. And each of these may be considered with respect to the parts either of simple or compound sentences.

As to simple sentences, we may call that order *natural*, when all the words in a sentence are so placed, as they are connected with or follow each other in a grammatical construction. And it may properly enough admit of this name, as it is founded in the nature of a proposition, and the relation of the several words of which it consists to each other. This we explained in the last chapter, and illustrated by proper examples; and shall therefore only give one instance of it here, to introduce the subject we are now upon. And it is this: *The fame of Socrates excited Aristotle to the profession of oratory*. Here these words, *the fame of Socrates*, contain the subject of this sentence, with what relates to it; and all those which follow, *excited Aristotle to the profession of oratory*, make up the predicate and its dependants. And in both parts each word grammatically considered stands in its proper order of construction. And this seems agreeable to the natural way of conveying our thoughts, which leads us first to express the subject or thing of which some other thing is said, before the predicate or that which is said concerning it; and with respect to both, as every idea succeeds another in the order of our conceptions, to range it in the same order when we communicate them to others. Our language in the general keeps pretty

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pretty much to this method. But in one thing particularly it recedes from it; and that is, in placing adjectives, which denote the properties of things, before their substantives or subjects, whose properties they are: As when it is said, *Evil communication corrupts good manners*. And this we always do, except something follows which depends upon the adjective. So we say, *He was a man eminent for his virtue*; not, *an eminent man*.

Artificial order, as it respects simple sentences, has little or no regard to the natural construction of words; but disposes them in such a manner, as will be most agreeable to the ear, and best answer the design of the speaker. The Latins take a much greater liberty in this respect than we do, or than the nature of our language will permit. Quintilian says, it is best for the verb to stand last, when there is no particular reason to the contrary. And he gives this reason for it, *because the force of the sentence lies in the verb*. So that, according to him, they seem to have had this view in putting the verb at the end; that as the whole sentence is imperfect without the verb, the mind being thus held in suspense might receive the deeper impression from it at last. They likewise separate such words as have an immediate relation between them or dependence one upon another, and place any of them first or last as they please. In short, their order seems in a manner arbitrary, if it does not break in upon perspicuity, to which they usually attend. But most of these things are unfuitable to the genius of our language. One might say indeed, *Convince him you cannot*; instead of saying, *You cannot convince him*: Or, *With my own eyes I saw it*; for, *I saw it with my own eyes*. And again: *In proportion to the increase of luxury the Roman state declined*; for, *The Roman state declined in proportion to the increase of luxury*. But the inversion of the words in the former order of these expressions, doth not sound so kindly to an English ear, which is not accustomed to such a manner of speaking.

As to compound sentences, that is, such as consist of two or more members, either simple or compounded; what relates to the words in each member separately, is the same as in simple sentences. But with regard to the disposition of the several members, that may be called the *natural order*, which fo places them as they mutually depend on each other. Thus the antecedent member naturally precedes the relative; as in this expression, *Men are apt to forgive themselves, what they blame in others*. In hypothetical sentences the conditional member naturally stands first. Thus: *If Socrates be a rational creature, he is a man*. That member which expresses the effect of an action naturally comes last; as, *Though you offer ever so good reasons, you will not prevail with him*. The like may be said of time, with regard to things done in it; as, *The Roman eloquence soon declined, when Cicero was dead*. And to name no more, the reason of a thing naturally follows that of which it is the reason; as thus: *All the pleasures of life must be uncertain, since life itself is not secure*.

When this order is inverted, it may be styled *artificial*. So to keep to the instances already given, the two members in the first sentence may be thus inverted: *What they blame in others, men are apt to forgive*

themselves. In the second, in this manner: *Socrates is a man, if he be a rational creature*. In the third, thus: *You will not prevail with him, though you offer ever so good reasons*. And so in the rest: As, *When Cicero was dead, the Roman eloquence soon declined*; and, *Since life itself is not secure, all the pleasures of life must be uncertain*. The variety of inversions in a sentence may generally be greater or less in proportion to the number of its members. In the following sentence of Cicero, the natural order seems to be this: *If that greatness of mind be void of justice, which shews itself in dangers and labours, it is blameable*. Which may be varied by changing the place of the first and third member, in the following manner: *That greatness of mind is blameable which shews itself in dangers and labours, if it want justice*. Or by altering the place of all the three members thus: *That greatness of mind is blameable, if it be void of justice, which shews itself in dangers and labours*. But oftentimes one member may be included in another, as in the instance here given: *If that greatness of mind, which shews itself in dangers and labours, be void of justice, it is blameable*. Here the relative member is included in the conditional, which is placed first, and the antecedent member follows both. But in Cicero it stands thus: *That greatness of mind, which shews itself in dangers and labours, if it want justice, is blameable*; where the relative and conditional members are both included in the antecedent member. The Latin tongue commonly admits of a much greater variety in the transposition of members, as well as in that of single words, than suits with our idiom. In the following sentence the natural order is much preferable, as it best suits with the proper elevation and cadency of the voice in its pronunciation: *I am willing to remit all that is past, provided it may be done with safety*. But should we invert the members, and say, *Provided it may be done with safety, I am willing to remit all that is past*: the harmony of the cadency would be lost. And if the latter member be included in the former, the alteration will still be worse; as, *I am willing, provided it may be done with safety, to forgive all that is past*. Here the inflection of the voice falls upon the same member as before, and destroys the beauty of the period by its elevation afterwards. Some sentences admit of no involution of their members. Such are those whose members are connected by conjunctive or disjunctive particles. As: *Virtue furnishes the mind with the truest pleasure in prosperity, and affords it the greatest comfort in adversity*. And: *A wise man is neither elated by prosperity, nor depressed by adversity*. And the like may be said of those where the latter member begins with some illative or redditive particle. As in these instances: *The chief thing to be regarded in life is virtue, for all other things are vain and uncertain*. And: *Though fortune is always inconstant, yet she has many votaries*. Neither of the members in any of these ways of expression, and some others which might be named, can be included one in the other. In all the examples hitherto given, the sentences consist only of simple members; and indeed compound members are not so often inverted, nor included one in another, by reason of their length. However, we shall here produce one instance of each: *Whoever considers the uncertainty of human*

affairs, and how frequently the greatest hopes are frustrated; he will see just reason to be always on his guard, and not place too much dependence upon things so precarious. This sentence consists of two compound members, which here stand in their natural order, but may be thus inverted: *He will see just reason to be always on his guard, and not place too much dependence on things so precarious; whoever considers the uncertainty of human affairs, and how often the greatest hopes are frustrated.* In the following sentence one compound member is included in another: *Let us not conclude, while dangers are at a distance, and do not immediately approach us, that we are secure; unless we use all necessary precaution to prevent them.* Here the natural order would be: *While dangers are at a distance, and do not immediately approach us; let us not conclude, that we are secure, unless we use all necessary precaution to prevent them.*

But there are some other considerations relating to order, which, being taken from the nature of things, equally suit all languages. So in amplifying, there should be a constant gradation from a less to a greater; as when Cicero says, *Ambition creates hatred, shyness, discords, seditions, and wars.* On the contrary, in extenuating, we should descend from a greater to a less; as if, speaking of the ancient laws of Rome, one should say, *They were so far from suffering a Roman citizen to be put to death, that they would not allow him to be whipped, or even to be bound.* In constituting any whole, we put the parts first; as, *Invention, disposition, elocution, and pronunciation, make up the art of oratory.* But in separating any whole, the parts follow; as, *The art of oratory may be divided into these four parts; invention, disposition, elocution, and pronunciation.* In every enumeration care must be taken not to mix the whole with the parts; but if it be mentioned at all, it must either be put first or last. So it would be wrong to say, *He was a man of the greatest prudence, virtue, justice, and modesty:* for the word *virtue* here contains in it the other three, and therefore should not be inserted among them.

§ 3. Of Juncture and Number.

QUINTILIAN, speaking of composition, represents a discourse as very happy in that respect, when the *order, juncture, and number*, are all just and proper. The first of these, which gives rules for the due placing of the words and members of a sentence, has been already explained. We now proceed to the other two, which relate to letters and syllables; the former treating of their connection, and the latter of their quantity.

1. As to *juncture*. A due attendance is to be given to the nature of the vowels, consonants, and syllables in the connection of words, with regard to the sound.

As to the *first*, when a word ends with a vowel, and the next begins either with a different vowel, or the same repeated, it usually renders the pronunciation hollow and unpleasant. For, as Quintilian has justly observed, "This makes a chasm in the sentence, and and stops the course of it." For there must be some pause, in order to pronounce them both, or otherwise the sound of one will be lost. So, for instance, in pronouncing these words, *the other day*, unless you

stop a little after the word *the*, the sound of *e* will not be heard; and if it is dropt, it will occasion a rougher sound, from the aspiration of *th* twice repeated so near together, as *th' other day*. Therefore to prevent both these inconveniences, we usually say, *i' other day*. But the different consonants, which together with the vowels make up those syllables, often cause a considerable difference in the pronunciation, so as to render it more or less agreeable. As, if we say, *he overdid it*, the words *he over* have not so harsh a sound, as *the other*; though still they require some pause to keep them distinct. Besides, some vowels meet more amicably, and admit of a softer pronunciation, than others. Those which have the weakest and smallest sound, follow best; because they occasion the least alteration of the organ in forming the two sounds. Such are *e* and *i*; and therefore, without any chasm in the sound, or hesitation of the voice, we say, *he is*. But where the action of the organs is greater, and the sound stronger, the pronunciation is more difficult: as when we say, *tho' all*. For here is a contrary motion of the lips, which are first put forward in founding the *o*, and then drawn backward to pronounce the *a*; and therefore the sound is much softer to say, *tho' every*, where their action is less. And the like ill effect commonly happens from the repetition of the same vowel: as if we say, *go on; or, you usually act thus*. There is a considerable difference between these two expressions, in repeating the sound of the vowel, and where either of them is doubled in a single word. For then the same sound only is protracted by one continued motion of the organ; as in the words *good, and deem*. But here the sound is repeated again by a new action of the organ; which, if precipitated, obscures the sound of one of the vowels; and, if too much retarded, makes a chasm in the pronunciation; either of which is unpleasant to the ear.

But as the coalition of two vowels occasions an hollow and obscure sound, so the meeting of some consonants renders it very harsh and rough. Thus the words *king Xerxes, and public good*, when so placed, have not only a roughness, but likewise a difficulty in their pronunciation, from the contrary action of the lips; which in the former are first drawn back and then forward, but in the latter the contrary way, and in both of them with some considerable force. But this may very easily be avoided, by saying, with a little alteration in the words, *Xerxes the king, and the good of the public*. So likewise the words *ill company*, have a softer sound, than *bad company*, for the same reason. To multiply instances of this kind seems unnecessary, which is frequently occur in all discourse.

The repetition of the same syllable, at the end and beginning of words, is the last thing to be considered. And a little observation will convince us, that where this happens, it generally renders the sound either confused, or unpleasant. Cicero was often rallied on account of this verse:

O fortunatam natam me consule Roman.

Every one will easily perceive a disagreeable sound in the following expression: "A man many times does that unadvisedly, of which he afterwards repents." The chime of the words *man many* both seems affected, and displeases the ear. But this will soon be remedied, if we separate those two word, and say, "A man

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From the short account here given of this part of composition, it is easy to perceive what things are necessary to render it most complete and accurate; which are these following. If a word end with a vowel, the next ought to begin with a consonant, or such a vowel whose sound may agree well with the former. But if a word conclude with a consonant, either a vowel should follow, or such a consonant whose pronunciation will suit with it. And lastly, the same syllable ought not to be repeated at the end of one word, and the beginning of the next. It has been observed by some critics, that the following verse at the beginning of Virgil's *Æneid*, has all these properties:

Arma virumque cano, Trojæ qui primus ab oris.

Where any word in this verse ends with a vowel, the next begins with a consonant; and where any one ends with a consonant, the next begins with a vowel; and there is no repetition of the same sound throughout the whole. But this is what rarely happens, especially in our language, which abounds with consonants. And what Quintilian says of the coalition of vowels, in treating upon this subject, seems applicable to the whole. "This" says he, "is a thing not much to be dreaded; and I know not whether the neglect of it, or too great a concern about it, be worse. It necessarily checks the vigour of the mind, and diverts it from matters of great importance. And therefore, as it shews negligence to permit it, so to be in constant fear of it discovers a low genius." This was the opinion of that judicious writer. And as these things cannot always be attended to, it may be sufficient to avoid them, where they prove very offensive to the ear, and it may be done without some greater inconvenience. So in this sentence, *Honesty is the best policy*, the coalition of *t* and *p* in the two last words *best policy* produces a roughness in their pronunciation; but as the expression is strong, and cannot perhaps be well altered for the better, the sound here ought to give way to the sense.

47 II. *Number.* This respects the quantity of syllables, as *Juncture* does their quality. In the Greek and Roman languages every syllable has its distinct quantity; and is either long, short, or common: two or more of which joined together in a certain order make a foot, and a determinate number of these in a different order constitute their several sorts of metre. This variety of sounds gives a much greater harmony to their poetry, than what can arise only from the seat of the accent, and the similitude of sound at the end of two verses, which chiefly regulate our metre. And although their prose was not so confined with regard to the feet, either as to the kind or place of them, as their metrical compositions; yet it had a sort of measure, more especially in the rise and cadency of their periods. This they call *rhetorical number*. And accordingly the ancient writers upon this art acquaint us, what feet are best suited to the beginning, middle, or conclusion of a sentence. Such rules are not applicable to our language, which has not that accurate distinction of quantity in its syllables. For we are apt to confound accent with quantity, and pronounce those syllables longest, on which we lay the accent, though in their nature they are not so. As in the

word *admirable*, where none but the first syllable *ad* is pronounced long; though that is only rendered so by position, and the two following are so by nature. And again, in the word *avarice*, we found the first *a* long for the same reason, and the second short; contrary to the nature of both those vowels. However, we shall offer a few things that may be of some use to modulate our periods and adjust their cadency.

A great number of monosyllables do not stand well together. For as there ought to be a greater distance in the pronunciation between one word and another, than between the syllables of the same word; such pauses, though short, yet, when too frequent, make the sound rough and uneven, and by that means spoil its harmony. And this may seem more necessary to be attended to, because the English language abounds so much with monosyllables. On the contrary, a continuation of many long words makes a sentence move too slow and heavily. And therefore such periods generally run best, which have a proper mixture of words of a different length. Besides, as every word has its accent, which with us stands for quantity; a number either of monosyllables, or long words, coming together, so far abates the harmony, as it lessens the variety.

Again, several words of the same ending do not stand well together, especially where the accent falls upon the same syllable in each of them. For this creates too great a jingle by the similitude of sound; and is apt to displease, from an appearance of affectation. Of this kind is the following sentence: *Nothing is more welcome, delightful, or wholesome, than rest to a wearied man.* In such expressions therefore, if the order of the words cannot well be altered, some other word should be substituted in the room of one of them at least, to diversify the sound. So in the example here given, the sound might be varied by saying: *Nothing is more welcome, pleasant, or wholesome.*

But to add no more, if a sentence end with a monosyllable, it is apt to hurt the cadency, and disappoint the ear; whereas words of a moderate length carry a greater force with them, by the fulness of their sound, and afford the ear what it expected. And there is one sort of monosyllables more especially, which never stand well at the conclusion of a period, tho' we frequently find them there; and these are the signs of cases. Thus we say: *Avarice is a crime, which wise men are too often guilty of.* But the cadency would doubtless be more agreeable if it was altered thus: *Avarice is a crime, of which wise men are too often guilty.* Every one must perceive, when the accent falls upon the last syllable in the sentence, as it does if it end with *of*, the sound is not so pleasant, as when it rests upon the preceding syllable in the word *guilty*. Nor are very long words well suited either to the beginning or conclusion of a period; for they retard the pronunciation at first, and fall too heavy at the end.

CHAP. III. Of Dignity.

DIGNITY, consists in the right use of tropes and figures. It is not sufficient for an orator to express himself with propriety and clearness, or in smooth and harmonious periods; but his language must likewise be

be suited to the nature and importance of the subject. And therefore, as *elegance* gives rules for the first of these, and *composition* for the second; so does *dignity* for the last of them. It is very evident, that different subjects require a different style and manner of expression; since, as Quintilian says, "What is magnificent in one discourse, would be turgid in another; and those expressions, which appear low upon a sublime subject, would suit lesser matters: and as in a florid harangue a mean word is remarkable, and like a blemish; so any thing lofty and bright upon a trivial argument is disproportionate, and like a tumour upon an even surface." Now this variety in the manner of expression arises in a great measure from *tropes* and *figures*, which not only enliven and beautify a discourse, but give it likewise force and grandeur; for which reason this part of elocution seems to have been called *dignity*.

Tropes and figures are distinguished from each other in several respects. Tropes mostly affect single words, but figures whole sentences. A trope conveys two ideas to the mind by means of one word; but a figure throws the sentence into a different form from the common and usual manner of expression. Besides, tropes are chiefly designed to represent our thoughts, but figures our passions.

§ 1. Tropes.

- 49 A *trope* as it has been usually defined, is, the change of a word from its proper signification to some other with advantage. The words, with advantage, are added in the definition, because a trope ought not to be chosen, unless there is some good reason for using it rather than the proper word. But in what manner, or how far, it can be said of all tropes in general, that they change the proper signification of words, will best appear by considering the nature of each kind of them separately. Now in every trope a reference is had to two things, which occasions two ideas, one of the thing expressed, and another of that thing to which it has a respect, and is supplied by the mind. For all tropes are taken either from things internally related, as the whole and a part; or externally, as cause and effect, subject and adjunct; or from some similitude that is found between them; or from a contrariety. The first of these is called *synecdoche*, the second *metonymy*, the third *metaphor*, and the last *irony*. We shall endeavour to illustrate this by examples. When we say, *Hannibal beat the Romans*; the meaning is, that Hannibal and his army did this. So that altho' in some sense a part may here be said to stand for the whole, which makes it a *synecdoche*; yet strictly speaking, the word *Hannibal* does not alter its sense, but there is an ellipsis in the expression, Hannibal being put for himself and his army. But if we say, *Cicero should be read by all lovers of eloquence*; here indeed the word *Cicero* appears to be changed from its proper sense, and to signify the books of Cicero; which is a *metonymy*, the author being put for his works; and therefore such expressions need not be deemed elliptical. Again, if any one speaking of a subtle and crafty man, should say *he is a fox*; the meaning is, he is like a fox; which is a *metaphor*, where the word *fox* retains its proper sense, and denotes that animal, to which the man is compared on account of his craft. Lastly, if a person say to another, *Well done*; meaning that the

thing was ill done, the word *well* keeps its own sense; but from the manner of its pronunciation, or some other circumstance attending the expression, it will be evident that the contrary is intended: which is called an *irony*. From these instances it may appear in what latitude we must understand the common definition of a trope, which makes it to consist in the change of a word from its proper sense into some other. But tho' in reality there are but four kinds of tropes, which are distinguished by so many different respects which things bear one to another; yet as these several respects are found in a variety of subjects, and attended with different circumstances, the names of *tropes* have from hence been greatly multiplied; which, however, may all be referred to some or other of those already mentioned, as will be shewn when we come to treat of them in their order. And for distinction sake we shall call the former *primary*, and the latter *secondary*, *tropes*.

We now proceed to consider the reasons which have occasioned the introduction of tropes. And these, as Quintilian observes, are three; *necessity*, *emphasis*, and *beauty*.

1. Tropes were first introduced from *necessity*, because no language contains a sufficient number of proper words to express all the different conceptions of our minds. The mind considers the same thing various ways; views it in different lights; compares it with other things; and observes their several relations and affections; wherein they agree, and in what they differ. From all which reflections, it is furnished with almost an infinite number of ideas; which cannot all of them be distinguished and expressed by proper words, since new ones occur daily. And were this possible, yet would it be impracticable; because the multitude of words must be so vastly great, that the memory could not retain them, and be able to recall them as occasion required. Tropes have in a good measure redressed both these inconveniences; for by means of them the mind is not burdened with a numberless stock of different words, and yet nothing seems to want a name. Thus sometimes, where a word is wanting to express any particular thing, it is clearly enough represented by the name of some other thing, by reason of the similitude between them. At other times, the cause is signified by the effect; the subject by the adjunct; or the contrary. And the whole is often understood by a part, or a part by the whole. And thus by the use of tropes, the mind is helped to conceive of something not expressed, from that which is expressed. It is much the same case, as when we have occasion to speak of a person, whose name we are either unacquainted with, or have forgot; for by describing his person, abode, or some other circumstances relating to him, those we converse with as well understand whom we mean, as if we mentioned his name. So the shepherd in Virgil, when he could not think of the name of Archimedes, describes him by his works:

And what's his name who form'd the sphere,
And steu'd the seasons of the sliding year?

Besides, it sometimes happens in a discourse, that those things are necessary to be said, which, if expressed in their proper terms, would be offensive; but being clothed with metaphors, may be conveyed to the mind with decency.

2. A second reason above-mentioned for the use of tropes

tropes was, *emphasis*. Tropes do many times express things with greater force and evidence, than can be done by proper words. We receive much the greater part of our knowledge by our senses. And similitudes taken from sensible things, as in metaphors, very much assist the mind in its reflections upon those things which do not come under the cognizance of the senses. For it is certain, that we are sooner and more strongly affected with sensible objects, than with things of which we can have no ideas but from the internal operations of our own minds. Nay, sometimes one bright and lively trope shall convey a fuller and more just idea of a thing, than a large periphrasis. So when Virgil calls the Scipios *two thunderbolts of war*, he gives a more lively image of the rapid force and speedy success of their arms, than could have been conveyed by a long description in plain words. And in many cases the tropical use of words is so emphatical, and suited to the idea we design to excite; that in this respect it may be justly esteemed the most proper. So, *incensed with anger, inflamed with desire, fallen into an error*, are all metaphorical expressions, used in a way of similitude; and yet perhaps no proper words can be made use of, which will convey a more lively image of the thing we design to represent by them.

But *beauty* and ornament, as was observed before, have been another cause of the use of tropes. Some subjects require a more florid and elegant dress than others. When we describe or applaud, ornaments of speech and a gaiety of expression are requisite. And it is the business of an orator to entertain his hearers at the same time that he instructs them. Now Cicero, who was an admirable judge of the force and power of eloquence, has observed, that tropical expressions give the mind the greatest delight and entertainment. "I have often wondered (says he) why tropes should give greater pleasure than proper words. I imagine the reason must be, either that there is an appearance of wit in neglecting what is at hand, and making choice of something at a distance; or that the hearer is furnished with a different thought, without being led into a mistake, which affords a very agreeable pleasure; or that a whole similitude is conveyed to the mind by a single word; or that, particularly in the best and most lively metaphor, the image is presented to our sight, which is the quickest of our senses." And therefore he supposes, that "as garments were first invented from necessity, to secure us from the injuries of the weather, but improved afterwards for ornament and distinction; so the poverty of language first introduced tropes, which were afterwards increased for delight." Besides, a variety of expression is pleasing in a discourse. It is many times necessary that the same things should be repeated; and if this be done in the same words, it will grow tiresome to the hearers, and sink their esteem of the speaker's ability. Therefore, to prevent this, it is proper the expression should be varied, that although the sense be the same, it may give the mind a new pleasure by its different dress.

We come now, in the last place, to lay down some directions proper to be observed in the choice of tropes.

And first, as every trope gives us two ideas; one, of the word expressed; and another, which, by means of that, the mind connects with it; it is necessary, that the relation between these two appear very plain and

evident. For an obscure trope is always faulty, unless where some particular reason makes it necessary. And therefore tropes ought not to be too far-fetched, lest that should render them dark. For which reason Cicero says, he should not choose to call any thing destructive to a person's fortune, *the Syrtis of his patrimony*, but rather *the rock of it*; nor the *Charybdis of his estate*, but *the gulph of it*. For those, who either did not know that the Syrtis were two quicksands upon the coast of Africa, or that Charybdis was a gulph in the streight of Sicily, both of them very destructive to mariners, would be at a loss to understand the meaning of the metaphor. Besides, metaphors taken from things we have seen, affect the mind more forcibly than those which are taken from such things as we have only heard. Now there is scarce any one who has not seen a rock or a gulph; but there are very few persons, comparatively, who have been either at Charybdis or the Syrtis. It is necessary therefore in a good trope, not only that there be a near affinity between the two ideas, but likewise, that this affinity be very obvious and generally known, so that the word be no sooner pronounced, but both images do immediately present themselves to the mind.

Again, as a trope ought to be very plain and evident, so likewise should it bear a due proportion to the thing it is designed to represent, so as neither to heighten nor diminish the just idea of it. Indeed, sometimes, when we speak of things indefinitely, we say too much, lest we should seem to say too little. And this manner of speaking is called an *hyperbole*; which is not uncommon in the sacred writings. So, for instance, Saul and Jonathan are said to be *swifter than eagles, and stronger than lions*. But even in this way of expression a proportion is to be observed. For some very considerable and unusual excess of the thing in its kind is at least designed by it; which perhaps cannot, or however is not necessary to be defined. And therefore Quintilian blames Cato for calling the top of an hill a *wart*; because the proportion between the two ideas is no ways adequate. And so, on the contrary, Aristotle censures Euripides for calling rowing, *the empire of the oar*. Poets indeed are allowed a greater liberty in this respect. But an orator should be modest in his expressions, and take care that he neither so heighten nor diminish the natural ideas of things by tropes, as to lead his hearers into mistakes.

But further: As a moderate use of tropes, justly applied, beautifies and enlivens a discourse; so an excess of them causes obscurity, by running it into abstruse allegories and riddles. Tropes are not the common and ordinary dress of our thoughts, but a foreign habit: And therefore he who fills his discourse with a continued series of them, seems to act like one who appears in public in a strange dress; which no man of character would choose to do.

Moreover, as one use of tropes is pleasure and entertainment, we should endeavour to make choice of such as are smooth and easy. But if at any time we think in necessary to use a harsh trope, it is proper to soften it by some precaution. For, as Cicero very handsomely says, *a trope should be modest, since it stands in a place which does not belong to it; for which reason it should seem to come thither by permission, and not by force*. And therefore, when he thought it harsh to say,

say,

say, *The death of Cato made the senate an orphan*; he guards the expression by saying, *The death of Cato has (if I may be allowed to say so) rendered the senate an orphan*.

And, to add no more, care should be taken how we transfer tropes from one language into another. For as they are frequently taken not only from natural things, or such notions as are common to the generality of mankind, but likewise from the manners, customs, and occurrences of particular nations; so they may be very plain and obvious to those among whom they took their rise, but altogether unintelligible to others who are unacquainted with the reason of them. It was customary for the Roman soldiers to carry their money in their girdles; hence it was the same thing with them to say, *a person had lost his girdle*, as that *he had lost his money*. And because the Romans wore the *toga*, which was a long gown, in time of peace, and a different garb when engaged in war, their writers sometimes use the word *toga* to signify peace. But as neither of these customs is in use among us, so neither would the tropes suit our language, or be generally understood by us. And even in such tropes as are taken from the common nature of things, languages very much differ. There is a very beautiful trope in the account of St Paul's shipwreck, where it is said, *The ship was caught, and could not bear up into the wind*. The original word, that we translate *bear up*, is ἀντιβαλεῖν; and properly signifies, *to look, or keep its eyes against it*; which is a very strong and lively image, taken from animate beings, and when applied to men often signifies *to withstand or resist*: as, ἀντιβαλεῖν πολέμῳ, *to resist an enemy*; and Plutarch says of Demosthenes, that he could not ἀντιβαλεῖν τῷ πεινῳ, *look against or resist the power of money*. Nothing is more common with Latin writers, than to call men of a public spirit and true patriots, *lumina et ornamenta republicæ*, that is, *the lights and ornaments of the state*: And we have borrowed from them the use of both these metaphors. But because tropes and figures illustrate and heighten the style, they call them also, *lumina orationis*, or, *the lights of a discourse*. It sometimes happens, that only the tropical sense of a word is taken from one language into another, and not the proper signification of the same word. So *scrupulus* in Latin properly signifies *a little stone, which getting into the shoe hurts a person as he walks*; hence it is applied to the mind, and used to express *a doubt, or uneasy thought that gives it pain*. We have borrowed this latter sense of the word, but not the former.

ART. I. PRIMARY TROPES.

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I. *Metaphor*. A metaphor, as usually defined, is: *A trope, which changes words from their proper signification to another different from it, by reason of some similitude between them*. But that a word, when used metaphorically, does not alter its signification, but retains its proper sense, was shewn above. However, it may not be amiss to explain this matter more fully, and set it in a clearer light. Every *metaphor*, then, is nothing else but a short similitude. Cicero calls it, *a similitudo reduced to a single word*. And Quintilian to the same purpose says, that, “a metaphor is a short similitude, and differs from it only in this; that the former is compared to the thing we de-

sign to express, and the latter is put for it. It is a similitude, when I say of a man, he has acted like a lion; and a metaphor, when I say, he is a lion.” Thus far Quintilian. Now in every similitude three things are requisite: two things that are compared together; and a third, in which the similitude or likeness between them consists. And therefore, to keep to this example, when Horace calls a Roman soldier *a lion*, if the word *lion* did not retain its proper sense, there could be no similitude; because there would not be two things to be compared together with respect to a third, which is necessary in every similitude, and was designed by this expression. The sense of which is plainly this: *That as a lion seizes his prey with the greatest fierceness, so a Roman soldier with like rage and fury attacked his enemies*. In the same manner, when Cicero calls Piso *the vulture of the province*, his meaning is, that he was like a vulture, or acted in such a manner as a vulture acts, that is, rapaciously. So that the real difference between a metaphor and a similitude consists in this; that a metaphor has not those signs of comparison which are expressed in a similitude. But some persons have run into mistakes in reasoning from tropes of this kind. For they have so argued from metaphorical words, as if all the affections and properties of the things expressed by them might be attributed to those other things to which they are applied, and by that means have strained the comparison (which has usually but one particular view), in order to make it tally in other respects, where there is not that similitude of ideas. We will endeavour to make this evident by another example from Cicero, where he calls M. Anthony *the torch of the state*. The similitude between Anthony and a torch lay in this: *That as a torch burns and destroys every thing within its reach, so Anthony brought devastation and ruin wherever he came*. Now a torch has not only a property to burn, but also to give light; but the similitude would not hold in this respect, nor was it at all designed. For Cicero never calls a wicked profligate man, as Anthony was, *the light of the state*; though he often gives that character to good and virtuous men, who by their examples do as it were enlighten others, and shew them the way to be happy themselves and useful to others. But though metaphors are usually taken from a similitude between two things, as in the instances here mentioned; yet sometimes they are founded in the similitude which two things bear to two others in some particular respect, by means whereof what properly belongs to one of them is transferred to the other: the former of which are called *simple metaphors*, and the latter *analogous*. Hence the rudder of a ship may be called *its reins*; for what the reins are to a horse, that the rudder is to a ship in guiding and directing it. So that here is a double similitude, one between a ship and an horse, and another between the rudder of the former and the reins of the latter; and from the analogy between the use of the rudder to the one and reins to the other, the reins, which belong properly to the horse, are applied to the ship. Again, some metaphors are reciprocal, in which the similitude holds either way. Thus to steer and to govern are used reciprocally both of a ship and a state: the proper expressions being, *to steer a ship*, and *to govern a state*; and the contrary metaphorical.

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cal. But though we say, *the foot of a mountain*, borrowing the similitude from animals; yet we do not say, on the contrary, *the bottom of an animal*, meaning his feet; and therefore that metaphor is not reciprocal. From this account therefore of the nature of a metaphor, it may be said to be: *The application of a word by way of similitude to some other thing than what it properly signifies.* And the plainer this similitude appears, the greater beauty there is in the trope.

The use of metaphors is very extensive, as large as universal nature. For there are scarce any two things which have not some similitude between them. However, they may all be reduced to four kinds; which was the second thing propoed to be considered.

The first kind of metaphors therefore may be taken from similitudes between animate beings. As where those things, which properly relate to brutes, are accommodated to men; or those which belong to men are applied to brutes. Of the former sort is that joke of Cicero: *My brother being asked by Philip, why he barked so; answered, Because he saw a thief.* Here *barking*, the property of a dog, is applied to a man: And the reply does not seem to carry more severity, or harshness with it, than the question. By the latter sort we say, *a crafty fox*, and *a generous horse*; which are affections that properly relate to men. And to this kind of metaphors may those likewise be referred, when that which properly belongs to the senses is applied to the mind. Thus we often say *that we see a thing*, when we mean *that we understand or apprehend it.* And in the same sense we say, *that we hear such a thing*, or *person.* And by the like manner of expression, a person is said *to smell out a thing.* And those who have a genius or disposition for any art or science, are said *to have a taste for it*; and such as have entered upon the study of it, are said *to have a touch of it.* These are common ways of speaking in most languages, and very expressive of what is intended by them. And we may also bring those metaphors under this head, by which the properties and affections of men are attributed to the Deity: as, when God is said *to hear, see, be angry, repent*, and the like; which are forms of expressions very frequent in the sacred writings.

A second kind of metaphors lies between inanimate things, whether natural or artificial, which bear some similitude to each other. And this head is very extensive. Thus we say, *floods of fire*, and *clouds of smoke*, for large quantities. And so likewise, *to inflame an account*, that is, to heighten or increase it; with innumerable others of the like sort. In the two first of these instances, the terms proper to one element are applied to another; and as those elements of fire and water are opposite to each other, they shew the extensiveness of this trope, that there are no things in nature so contrary, but may come within the limits of it, and be accommodated to each other in a way of similitude. In the last example, a natural action is applied to what is artificial.

A third sort of metaphors is, when inanimate things are applied to animals, on account of some like properties between them. Thus Homer calls Ajax, *the bulwark of the Greeks*, on account of his valour, which like a wall defended them from the Trojans. And nothing is more common with Cicero, than to brand ill

men with the character of being *the pest of the state*, by reason of the mischief which they bring to the public. So likewise he calls Zeno the philosopher *an acute man*, for his great discernment and quick perception of things; fetching the allusion from metals when brought to an edge or a point. As on the contrary, old Chremes in Terence calls himself *a stone*, for want of apprehension. And we say, *a gay person*, and *a bright genius*, by this kind of metaphor.

The fourth and last kind of metaphors is that by which the actions and other attributes of animals are accommodated to inanimate things. Thus Cicero, speaking of Clodius, says: "The very altars, when they saw that monster fall, seemed to move themselves and assert their right against him." Here the words *saw*, *move*, and *assert*, are all metaphors taken from the properties of animals. And Virgil, when he would represent the impetuous force and rapidity of the river Araxes, says, *it disdained a bridge.* And it is a very useful epithet, which Homer gives to words, to call them *steeples*, or *winged*, to intimate the swiftness of speech.

Lastly, as to the choice of metaphors, those are esteemed the finest and strongest, which give life and action to inanimate things. The reason of which is, because they do as it were invigorate all nature, introduce new forms of beings, and represent their images to the sight, which of all the senses is the quickest, most active, and yet most unwearied. What can be more moving, or in stronger terms express the villany of Clodius, than when Cicero says, "The very altars of the gods seemed to exult at his death." And the same great orator particularly commends those metaphors, for their sprightliness and vivacity, which are taken from the sense of seeing; as when we say *a bright thought*, or *a gay expression.*

However, care must be taken not to venture upon too bold and daring metaphors. Poets indeed claim greater liberty in this respect, whose view is often to amuse, terrify, or delight, by heightening the just and natural images of things. But it is expected the orator should reason coolly, though strongly and forcibly: and not by theatrical representations so transport the mind, as to take it off from reflection, unless perhaps on some particular occasion. And yet on the other hand, metaphors ought not to sink below the dignity of what they are designed to express; but the idea they convey should at least be equal to the proper word in the place of which they are substituted.

But there is a very great difference in the choice of metaphors, as they are designed either to praise or dispraise. One thing may be compared to another in a great variety of respects. And the same thing may be made to appear either noble or base, virtuous or vicious, by considering it in a different light. Such metaphors, therefore, as are chosen to commend, must be taken from great and laudable things; and on the contrary, those which are designed to discommend, from things vile and contemptible. Aristotle gives us a very pleasant example of this in the poet Simonides. A certain person, who had carried the prize at a race of mules, offered him a reward to write a poem in honour of that action. Simonides thought he did not

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bid high enough; and therefore put him off with saying, the subject was too mean to write in praise of mules which were the offspring of asses. But upon his being offered a larger, sum he undertook the task; and, as Aristotle observes, when he has occasion to speak of the mules in that poem, he does not mention them by that name, but calls them *the daughters of fleet and generous horses*, though he might with as much propriety have called them *the daughters of dull asses*. But it was the poet's business, in praising, to take the most advantageous part of the character. Where things are capable of such different turns, metaphorical expressions are generally most beautiful. And sometimes the same metaphor may be applied contrary ways, both in praise and dispraise, as it will suit different properties of the thing to which it refers. So a *dove*, in a metaphorical sense, may represent either *innocence or fear*; and an *iron heart* may denote either *courage or cruelty*; as an *hard head*, *strength or weakness of thought*. And this ambiguity in the application of metaphorical words, often affords occasion for jests and concise wit. We observed before, that Cicero never calls ill men, *lights of the state*. But he once in this manner calls Sextius Clodius, *the light of the senate*. For, when his kinsman Publius Clodius had been killed by Milo, and his corpse was brought to Rome, Sextius raised the mob, and in a tumultuous manner carried it into the senate-house, where they burnt it, and by that means set the building on fire: For which seditious action Cicero passes that joke upon him, under the metaphor of light, which elsewhere he always uses in a good sense.

But to proceed: All force and harsh metaphors should be avoided, the one being no less disagreeable to the mind than the other to the ear. Nor should they come too thick in a discourse. In a word, they ought not to be used, but either where a proper word is wanting, or they are more significant or beautiful than the proper word.

§1

II. *Metonymy*. This, as defined by Quintilian, is, *the putting one word for another*. But Vossius describes it more fully, when he calls it, "A trope, which changes the name of things that are naturally united, but in such a manner as that one is not of the essence of the other." That a metonymy is thus distinguished from the other tropes, has been sufficiently shewn already in the two last chapters. When it is said, to *put one word for another*, or, *to change the names of things*, the meaning is, that the word to be used changes its sense, and denotes something different from its proper signification. Thus, when *Mars* is put for *war*, and *Ceres* for *corn*, they lose their personal sense, and stand for the effects of which those deities were said to be the cause. So likewise, when Virgil says,

He drank the frothing bowl,

the word *bowl* must necessarily signify the liquor in the bowl. And when in another place, describing the temple of Juno at Carthage, in which the actions of the Trojan war were represented, and the images of the heroes, he makes Æneas, upon discovering that of Priam among the rest, cry out,

Lo here is Priam;

it is plain the word *Priam* there must stand not for his person, but his *image or figure*. And this property

of changing the sense of the word appears peculiar to metonymy. In treating upon a metaphor, we observed the mistake of those who teach, that a word used metaphorically loses its proper signification; whereas it only changes its place, but not its sense; being applied to a thing to which it does not naturally belong, by way of similitude. And as the not attending to this has run some persons into very great absurdities, in treating upon metaphorical expressions, and reasoning from them in the tropical sense; so the like has happened to others in some instances of a metonymy, where, by misapprehending their true nature, they have reasoned from them in the literal sense, as we shall shew presently. A metonymy is not so extensive as a metaphor, nor altogether so necessary: because nothing is said by a metonymy, which cannot be expressed in proper words; whereas metaphors are often used for want of proper words to express some ideas. However, metonymies are very useful in language; for they enrich a discourse with an agreeable variety, and give both force and beauty to an expression. And what we observed with relation to a metaphor, is true also of this trope; that some metonymies, even in common discourse, are more frequently made use of than the proper words in whose room they are put. So, *pale death*, *a blind way*, and *a happy state*, are very common expressions with us. And it is more usual to say, *This is such a person's hand*, or *I know his hand*, than his writing, when we intend this latter sense of the word.

We now proceed to the division of metonymies; which are commonly distinguished into four kinds, from the different manner in which things are naturally, but externally, united to one another. Now things are thus united, or one thing depends upon another, either with respect to its production, or in the manner of its existence when produced. In the former way the effect depends upon its cause, and in the latter the adjunct upon its subjects. And hence arise four sorts of metonymies, which receive their names from the *cause and effect*, the *subject and the adjunct*.

It is called a *metonymy of the cause*, when the external cause is put for the effect. The external cause is twofold, the agent and end, which are usually called the *efficient and final cause*. Of the former kind are such metonymies, where the inventor or author is put for what was invented or effected by him. Thus, as we said before, *Ceres* is sometimes put for *corn*, the use of which she was said first to have introduced; and *Mars* for *war*, over which he was thought to preside. And by this way of speaking, any artist or writer is put for his work. So Juvenal, blaming the luxury and profuseness of the Romans, says: *There are few tables without Mentor*; that is, which were not made by him, or after his manner. And our Saviour says in the parable of the rich man and Lazarus, *They have Moses and the prophets*; meaning, the books of Moses and the prophets. But under this sort of metonymy is included not only the agent, strictly so called, but also any means or instruments made use of in the doing of a thing, when put for the thing done. Thus, *polite literature* is called *humanity*, because it cultivates and improves the human mind. And in that expression of Cicero, *Words move nobody but him who*

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understands the tongue; the word tongue, which is the instrument of speech, is put for speech, or language. And in the like sense, arms are sometimes put for war, and the sword for slaughter. By the same kind of metonymy, likewise, any affection or quality is put for its effect. As when it is said, the end of government is to maintain justice; that is, such mutual offices among men, as are the effects of justice. And so likewise in that of Cicero, It is the business of magistrates to check the levity of the multitude; by which he means tumults occasioned by their levity. Moreover, as human affections are attributed to the Deity in a metaphorical sense, so several parts of the human body are likewise ascribed to him by this kind of metonymy. Thus, his hand and his arm are used to express his power; as his ear and eye, his care and providence; these being the instruments of such effects in mankind. Metonymies of the final cause are those, by which the end in doing a thing is put for the thing done. As when we say, The watch is set, meaning the watchmen, who are appointed for that purpose. And so likewise that expression, to make an example, as it signifies to punish, in order to deter others from the like crimes by such an example. As also that of Virgil,

Philis should garlands crop,

by which are meant flowers to make garlands.

The second kind of metonymy puts the effect for the efficient cause, whether the agent, or only the means and instrument. So Virgil calls the two Scipios *the destruction of Libya*, because they were the agents who effected it. And Horace compliments his patron Mæcenas with the titles of being *his guard and honour*; that is, his guardian, and the author of his honour. But when Cicero tells the citizens of Rome, that *the death of Clodius was their safety*, he means the occasion only of their safety. And elsewhere he calls that *a dark hope and blind expectation*; the effect of which was dubious and uncertain to those who entertained it. And in like manner, the sons of the prophets, when they were eating the pottage which Elisha had ordered to be set before them, cried out, *There is death in the pot*; that is, *some deadly thing*, as is presently after explained. And thus sweat, which is the effect of labour, is sometimes put for labour. As in the threat denounced against Adam, *In the sweat of thy face shalt thou eat bread*; that is, by labour in cultivating the ground. And, in allusion to this way of speaking, Anthony the orator tells Crassus, “the improvement of the style by constant exercise, as he prescribed, was a thing of much sweat.” And *virtue is said to be gained by sweat*, that is, continued care and exercise in subduing the passions, and bringing them to a proper regulation. But in these two expressions there is likewise a metaphor, the effect of bodily labour being applied to that of the mind. In all these instances, the effect is put for the efficient cause.

The third kind of metonymy is, when the subject is put for the adjunct. By subject here, in a large sense of the word, may be understood that wherein some other thing is contained, or about which it is conversant; as likewise the possessor with respect to the thing he possesses; and the thing signified, when put for the sign of it. Now, by the first of these ways of speaking, the seat of any faculty or affection, is used for the faculty or affection itself. So it is usual to

*say, a man of a clear head, when we mean a clear mind or understanding; the seat of the mind being in the head. And a person is said to have a warm heart, because the heart has been thought the seat of the affections. In like manner, the place where any actions are performed, is put for the actions done in it. As when Cicero says, “Do not always think of the forum, the benches, the rostra, and the senate;” meaning the discourses which were usually made in those places. So likewise the contrary, or place of residence, is put for the inhabitants, as in that passage of Cicero: “And to omit Greece, which always claimed the preeminence for eloquence, and Athens, the inventress of all sciences, where the art of speaking was invented and perfected; in this city of ours, (meaning Rome), no studies have prevailed more than that of eloquence.” Where the words Greece and Athens stand to denote the inhabitants of those places. And hither may also be referred those expressions in which the time is put for the persons living in it; as, *the degeneracy of the present age, the virtue of former times*. In the second way above-mentioned, the object is used for the person, or thing employed about it: As when Cicero says, “In time of battle the laws are silent;” where by *laws* he intends the judges, who pronounce sentence according to law. By the third of these ways, in which the possessor is put for the thing he possesses, we say, *to devour, destroy, or ruin a man*; meaning, not his person, but his estate. And mythologists explain the fable of Aëdon by this trope, who is said to have been devoured by his dogs: for by dogs they understand flatterers and parasites, who consumed his estate, and brought him to beggary. By the last way before recited, which puts the thing signified for the sign, statues and pictures are called by the names of the persons which they represent; as in that jest of Cicero upon his brother Quintus, when, as Macrobius relates, “being in the province which his brother had governed, and seeing a large portrait of part of his body, holding a shield, though Quintus was but a little man, he said, My half brother is bigger than my whole brother.” The Popish doctrine of transubstantiation is founded upon an abuse of this trope. For when our Saviour, speaking of the bread and wine at that time before him, says, “This is my body; and this is my blood;” his plain meaning is, they were the signs of his body and blood, the thing signified being put for the sign by this sort of metonymy. But the Papists take the expression literally, which must doubtless be very absurd; since the words relate to the time then present, while Christ was yet living, and spoke them; when it was impossible for the bread and wine to be converted into his body and blood, it being evident to all who were present, that those elements, and his body, existed separately at the same time. But if the words are explained by this trope, the sense is plain and easy, and the way of speaking familiar to all writers. Whereas they who plead for the literal sense might with equal reason assert, that those expressions above-mentioned are to be taken literally, in which several parts of the human body, as the hand, the arm, the ear, and the eye, are ascribed to the Deity; or that, when our Saviour in a metaphorical sense calls himself *a vine*, and *a door*, these words were designed to be applied to him strictly and properly, and not by way of limitation.*

litude only, as is the case in all metaphors.

The fourth kind of metonymy is that wherein the adjunct is put for the subject, which is done in the same variety of ways as the former. It is therefore a metonymy of the adjunct, when the thing contained is put for that which contains it. As when Virgil says, "They lie down upon purple;" that is, upon couches dyed with purple. And again, "They crown the wine;" meaning the bowl which contained the wine, it being the custom of the ancients to deck their bowls with garlands at their entertainments. By these tropes likewise virtues and vices are put for the persons in whom they are found. As in that beautiful passage of Cicero, where, comparing the profligate army of Catiline with the forces of the state, he says, "On this side modesty is engaged, on that impudence; on this chastity, on that lewdness; on this integrity, on that deceit; on this piety, on that profaneness; on this constancy, on that fury; on this honour, on that baseness; on this moderation, on that unbridled passion: in a word, equity, temperance, fortitude, prudence, and all virtues, engage with injustice, luxury, cowardice, rashness, and all vices." And to this trope those expressions are to be referred, in which any thing is put for the object about which it is conversant. As in that saying of the wife man, "Hope deferred makes the heart sick;" where hope is put for the thing hoped for. And thus Suetonius calls the emperor Titus *the love and delight of mankind*, whose mild and obliging temper rendered him the object of those agreeable affections to all persons under his government. A third use of this trope is by putting a thing for the time in which it was done. Thus we say of a person, *he has served so many campaigns*; meaning for many summers, that being the usual time in which armies are drawn out into the field. Lastly, by this metonymy, the sign is put for the thing it signifies; as, *the sceptre for the regal dignity*, and *the sword for the authority of the magistrate*.

III. *Synecdoche*. This is a trope by which either the whole of a thing is put for a part of it, or a part for the whole; so that the two things, whose ideas are presented to the mind in this trope, are internally related to each other: by which, as has been shewn already, it is distinguished from all the other tropes. In a *synecdoche* the word retains its proper sense, and the expression is elliptical, as will appear by the several species of it, wherein the ellipsis in most of the examples is very obvious, and may with no great difficulty be supplied. Now a thing may be considered as an whole in three different respects, which logicians call an *universal, essential, and integral whole*. An universal whole is any genus with regard to its several species: as, an *animal* with respect to *mankind and brutes*; or *philosophy*, with respect to the *several arts and sciences* comprised under it. An essential whole consists of matter and form; as, a *man of body and soul*. And an integral whole is any body or quantity, with respect to the several parts of which the matter of it is composed, and into which it may be divided: as, an *human body* with respect to its *several members*; or a *year*, as divisible into *months, weeks, and days*. And thus rhetoric is an integral whole in respect to the four parts that compose it, namely, invention, disposition, elocution, and pronunciation. So likewise

any aggregate body, as a *civil community*, which is divisible into those who govern and are governed; or any army, consisting of the general, and his soldiers. As an whole therefore, in each of these acceptations of the word, is frequently put for a part, and a part for the whole; hence arise six species or sorts of *synecdoche*.

The first of these puts the genus for the species. Thus, virtue in general is sometimes used to denote some particular sort of virtue. As when Cicero mentions virtue as one of the four qualifications necessary in a general, he means greatness of mind. And so persons are often commended for instances of virtue shewn in their conduct, which respect only some single virtue, as justice, temperance, or the like: And in this sense Cicero calls Clodius a *deadly animal*. So when our Saviour commissions his apostles to *preach the gospel to every creature*, the meaning is, *every rational creature*. And thus likewise, to *talk to a person*, sometimes denotes the same thing as to *blame him*, which is one way of talking.

The second kind of *synecdoche* puts the species for the genus. Thus *bread* denotes any kind of food; as when a person is said to *get his bread by his labour*. In the same way of speaking, *money* is put for any kind of wealth in general. And it is an usual expression to say, that *wine destroys more than the sword*; that is, than any *hostile arms*. And the legal form of banishment among the Romans was, to prohibit persons the *use of fire and water*; that is, the *most common and ordinary necessities of life*, in which all others were included.

The third species of this trope is, when the essential whole is put for one of its parts; that is, either for the matter or form. Thus, in the evangelist, Mary Magdalen says, *They have taken away my Lord, and I know not where they have laid him*; meaning his *body*. So it is usual to say of a deceased person, *He was buried at such a time*. And in the inscriptions of sepulchral monuments we frequently meet with this expression, *Here lies such an one*; that is, his *corpse*. Nor are instances uncommon in which the whole being is put for the form. Thus when Cicero says, *Those persons live, who have fled from the confinement of the body, as from a prison*; by persons must necessarily be understood their *souls*, which are here distinguished from and set in opposition to their *bodies*. And so Virgil represents *Aeneas* as meeting with *Dido* and some of his Trojan friends in the infernal regions; by which are meant their *ghosts*.

The fourth kind of *synecdoche* is, when either the matter or form is put for the whole being. Thus *silver and gold* are used to signify money made of those metals; as when we say, *I have so much silver, or so much gold*. And the word *soul*, both in our own and other languages, is put for the *whole person*. So with us, a *merry soul*, and a *dull soul*; in Cicero, *dear souls*; and in Horace, *candid souls*, are all used in this tropical sense. But this way of speaking occurs nowhere more frequently than in the sacred writings. Thus, for instance, it is said, *All the souls which came with Jacob into Egypt*, meaning the *persons*. And again, *The soul that sinneth it shall die* from which expression, and others of the like import, some persons, by not attending to the nature of this trope, have been erroneously led to infer that the soul is naturally mortal. But sometimes only part of the matter

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matter stands to expresse the whole essence or being. So we imitate the Latins in using the word *caput* or *head* to denote either a *person* or *thing*. For, as with them *lepidum caput*, so with us a *witty head*, signifies the same as a *man of wit*. And in the same sense, *so many head* of cattle means *so many entire cattle*.

By the fifth sort of *synecdoche*, the whole of any material thing or quantity, whether continued or discrete, is put for a part of it. So when Cicero says, *A war is kindled through the whole world*; in compliment to his country, he calls the Roman empire *the world*. And this expression is also used by historians. Thus Cornelius Nepos, speaking of the quarrel between Mark Anthony and Augustus, tells us, that *each of them desired to be lord of the world*. And in like manner St Luke says, *There went out a decree from Cæsar Augustus, that all the world should be taxed*. So in St Paul's shipwreck, it is said, *They ran the ship aground, that is, the head of her*; for it is plain by what follows, that the stern was loose. And as to discrete quantity, our Saviour, using this trope, said he should be *three days and three nights in the heart of the earth*. Though he did not continue three whole days and nights in the grave, but only part of the first and third day, and the whole second day, with the two whole nights between the first and third day, according to our way of reckoning. For he was buried on Friday in the afternoon, and rested in the grave that night, with the following day, which was the Jewish Sabbath, and was risen on the morning of the next day. So that we must necessarily have recourse to this *synecdoche*, which puts the whole for the part, to clear up that event.

By this kind of *synecdoche*, also, the plural number is sometimes put for the singular. Thus St Matthew says, *The thieves who were crucified with our Saviour reviled him*: though it is plain from St Luke, that only one of them did so. It may also be referred to this trope, when a certain number is put for an uncertain one. So it is an usual way of expression to say, *I have seen or done such a thing an hundred or a thousand times*; when perhaps so many are not really intended, but only in general some considerable number.

The sixth and last kind of *synecdoche* puts a part of any material thing or quantity for the whole of it. So we say of a man, *He shelters himself under such an one's roof*; that is, *in his house*. And of a fleet, that it *consists of so many sail*; meaning, *so many ships*. And by this trope, that is ascribed to a single person, which was done by the assistance of others, and in conjunction with them. As when it is said, that *Hannibal killed forty thousand Romans at the battle of Cannæ*: For an army is an aggregate body, of which the general is the head, and consequently the chief part of it. And to this kind of *synecdoche* may also be referred such expressions in which the singular number is put for the plural: as if one should say, *A man is liable to be misled by the influence of irregular passions*; meaning *all men, or mankind in general*. Or when less than the real number is put for any round number. Thus some ancient writers, when they speak of the Grecian armada that came against Troy, call it a *fleet of a thousand ships*; though, according to Homer's list, it contained 1186. And so likewise the Greek

interpreters of the Old Testament are usually called *the Seventy*; whereas, in reality, they were seventy-two.

IV. *Irony*. This is a trope in which one contrary is signified by another: As if any one should say, *Well done*; when at the same time his design is to intimate that the thing was *ill done*. So that, by this manner of expression, the speaker appears to mean something contrary to the sense of the word he makes use of. Not that the word is changed from its usual signification; but by the circumstances attending the expression, we perceive the contrary to what is spoken is intended. Quintilian observes, that an irony may be known one of these three ways: "By the manner of pronunciation, or from the nature of the person or the thing. For (as he adds) where any of these do not suit with the words, it is plain the speaker intends the contrary." The irony is very plain from the manner of pronunciation in that passage of Terence, where Simo speaking to his servant by way of reproof, says, "You have taken great care indeed." From the circumstances of the person, when Cicero, addressing to Catiline, says, "He went to your companion, that excellent man, Marcus Marcellus." When he calls him an *excellent man*, it is evident he means the contrary; because no good man would be a companion of Catiline. And when he begins his oration for Ligarius with saying, "Cæsar, this is a *new* crime, and never heard of till now," the thing he is speaking of shews it to be an irony; for it was not new, as all who were present very well understood.

The subjects of irony are vices and follies of all kinds. And this way of exposing them is often more effectual than serious reasoning: For many persons, who, either from temper or want of reflection, cannot be moved by the force of an argument, are not proof against the poignancy of wit and railery. And therefore we find the most grave and serious persons have not declined the use of this trope upon proper occasions. Socrates, whom the oracle pronounced the wisest man of his age, gave so much into it, that he got the name of *ωῦρ*, that is, the *droll*. In the sacred writings we have a remarkable instance of it in the prophet Elijah, where he challenges the priests of Baal to prove the truth of his deity: For it is said expressly, "He mocked them, and said, Cry aloud, for he is a god; either he is talking, or he is pursuing, or he is on a journey, or peradventure he sleepeth, and must be waked." And Solomon takes the like method to expose the follies of youth by this ironical apostrophe, "Rejoice, O young man, in thy youth," with what follows, which is all ironical. Nay, our Saviour himself thought fit thus to reprove the Jewish doctors, when he says, "Full well ye reject the commandment of God, that ye may keep your own tradition." Where, by the words *full well*, or, as it is in the original, *καλως*, it is very evident that a severe reprimand was intended.

An irony is used on a variety of occasions, as we shall shew from some instances in Cicero. Sometimes he applies it in a way of jest and banter: As when he says, "We have much reason to believe the modest man would not ask him for his debt, when he pursues his life." At other times by way of insult and derision:

tion: Thus when he would represent the forces of Catiline as mean and contemptible, "O terrible war, (says he) in which this band of rakes are to march under Catiline! Draw out all your garriſons againſt this formidable body." Again, at other times, to give the greater force to his argument, he would ſeem as it were by this trope to recall and correct what he had ſaid before; as in his oration for Milo: "But it is fooliſh in us to compare Drufus, Africanus, Pompey, and ourſelves, with Clodius; all our calamities were tolerable, but no one can patiently bear the death of Clodius." Now the character of Clodius was ſo well known, that all who were preſent muſt be ſenſible he meant the contrary. And, to name no more, an irony is never uſed to greater advantage, than when it is followed immediately by ſomething very ſtinging. Thus, ſpeaking of Pifo, he ſays, "You have heard this philoſopher: he denies that he was ever deſirous of a triumph." And then addreſſing himſelf to him, he immediately adds, "O wretch! when you deſtroyed the ſenate, ſold its authority, ſubjected your conſulate to the tribune, overturned the ſtate, betrayed my life and ſafety for the reward of a province; if you did not deſire a triumph, what can you pretend you did not deſire?" This muſt effectually confound the falſe gravity at that time aſſumed by Pifo.

Art. II. SECONDARY TROPES.

SECONDARY TROPES are ſo called, becauſe they are all of the ſame nature with the former, and may be referred to ſome or other of them, though they have received different names.

They are chiefly eight in number; *Antonomafia*, *Communication*, *Litotes*, *Eupheuiſm*, *Catachreſis*, *Hyperbole*, *Metalepſis*, and *Allegory*. The three firſt of theſe are ſimple tropes, and may all be referred to a *Synecdoche*. But the five laſt are of a mixed or complex nature, and not confined to any one of the primary tropes; as will appear in treating upon them in order.

I. A common or general word is ſometimes uſed for the proper name of ſome particular thing or perſon which upon any account is eminent and remarkable. So we ſay, *He is gone to the city*, or *he came from the city*, that is, *London*. And by the *Scriptures* we mean the *Bible*. So likewiſe in ſpeaking of perſons, the orator is uſed for Cicero, the poet for Homer or Virgil, and the philoſopher for Ariſtotle: and it is not unuſual to ſay *the apoſtle*, when we mean St Paul. On the contrary, the proper names of things or perſons are ſometimes applied to any other of the ſame character. Thus we uſe the word *gopſel* for any certain and undoubted truth. And *Carthaginian faith* proverbially ſtood for the greateſt falſhood and deceit among the Romans. With the Greeks, *Hercules* ſignified a *ſtrong man*, *Neflor* a *wiſe man*, and *Irus* a *beggar*; and the names of *Samſon*, *Solemon*, and *Job*, now anſwer the like characters. Both theſe ways of expreſſion are often very emphatical, and heighten the idea more than where things are expreſſed by their own name. To call a good orator *Cicero*, or an excellent poet a *ſecond Virgil*, includes not only an encomium from the arts themſelves, but leads the mind to what is moſt perfect in them, and was peculiar to thoſe

perſons. Theſe forms of ſpeech are called *antonomafia*, and come properly under a ſynecdoche; for in the former the whole is put for a part, and in the latter a part for the whole.

II. Nothing is more common with orators, than a change of perſons. Sometimes, to avoid envy, and prevent the imputation of pride, in aſſuming to themſelves the praiſe of any laudable action, they aſcribe it to their hearers, and do not ſay, *we*, but *ye did ſo* and *ſo*. At other times, when it is neceſſary to remind them of ſomething which they have done amiſs, or to caution them againſt ſome wrong ſtep for the future; to prevent giving offence, they take it upon themſelves, or at leaſt join themſelves with them, and do not ſay, *you have done this*, or *do not you do this*; but, *we have done it*, or *let us not do it*. And again, at other times, in compliment to their hearers, they join them as partners in the commendable actions or virtues of other perſons; as when the whole body of the people is brought in to ſhare the praiſe ariſing from the ſucceſs of wiſe counſels or victorious arms. Such ways of ſpeaking often occur both in Demoiſtlenes and Cicero. They are called *communication*, and come properly under a ſynecdoche of the whole.

III. On the contrary, there is a mode of ſpeech, in which, by denying the contrary, more is intended than the words expreſs. This way of ſpeaking is called *litotes*; and is often uſed for modeſty ſake where a perſon is led to ſay any thing in his own praiſe, or to ſoften an expreſſion which in direct terms might found harſh or give offence. As if one ſhould ſay, *I do not commend you for that*; meaning, *I greatly diſcommend or blame you for it*. Where more being underſtood than the words expreſsly denote, it is properly a ſynecdoche of the part. Not that this manner of ſpeaking is always to be ſo interpreted; but where it is not, there is no trope; which muſt be judged of by the circumſtances of the diſcourſe. But that it frequently is ſo uſed, might be eaſily ſhewn from many inſtances; though it will be ſufficient to mention two or three. Cicero ſpeaking of Cotta, calls him *no mean orator*, whom he had juſt called a *very great orator*. And he ſays of Varro, that, "he purſued his ſtudies not without induſtry;" and afterwards gives him the character "of a man of the greateſt application." Which paſſages, compared together, plainly ſhew the import of thoſe negative expreſſions. And a friend of Cicero, writing to him, begins his letter thus: "Al- though I am ſenſible the news I ſend you will not be very pleaſant." This news was concerning the death of another friend of Cicero's; and there by the words *not very pleaſant*, muſt to be ſure be meant *very unpleaſant and melancholy*; but he choſe that expreſſion in the beginning of his letter, as the ſoſteſt and leaſt ſhocking, the better to prepare him for the following account of what that news was. And this way interpreters explain that paſſage in St Matthew: *And thou Bethlehem in the land of Juda are not the leaſt among the princes of Juda*; where, by *not the leaſt*, they underſtand the *greateſt*, or *very great*, upon account of the honour it received by the birth of our Saviour, as the words immediately following plainly intimate.

IV. When any diſpleaſing or ungrateful thing is expreſſed by a more ſoft and agreeable word, it is called *eupheuiſm*. And as the word made uſe of is either con-

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contrary to the proper word, or only different from it, it may be referred to different tropes. The Latins have a soft way of expressing their disregard to a person, by saying *valeat*; which we have borrowed from them, and say, *fare him well*. When the contrary being intended to what is expressed, it comes properly under an *irony*. And as the word *death* carries in it an idea that is disagreeable to human nature, instead of saying a person is dead, we often say *he is deceased*, or *departed*; which we have also taken from the Latins, who use the words *decessit* and *obit*, in the same sense. So that in both languages it comes under a *synecdoche* of the whole; to depart out of life being one sort of departure. But when the evangelist speaking of Stephen, who was stoned to death, expresses it by saying that *he fell asleep*; this is a beautiful metaphor, taken from the similitude between the death of a good man and sleep.

53 V. *Catachresis* signifies in general any harsh trope, though it is most commonly found in metaphors. It is principally used by poets, who make choice of it for novelty, or to enforce an expression, where the proper word does not seem strong enough. As when Milton, in describing the angel Raphael's descent from heaven, says, he

Sails between worlds and worlds;

where the novelty of the word enlivens the image more than if he had said *flies*. But it is sometimes found in the gravest authors, and even in the sacred writings. So we read of the *blood of the grape*. And Solomon says, *the horse-leech hath two daughters*. In all these instances the trope is a metaphor. But when St John says in the Revelations, *I turned to see the voice that spake to me*, it is here a metonymy of the adjunct; the word *voice* being put for the person who uttered it. In St Matthew we read of *Simon the leper*; not that he was then a leper, but had been so, and was cured; which is a *synecdoche* of the part. And when a criminal is said to *have had his reward*, that is, his punishment, it is an *Irony*.

59 VI. *Hyperbole* is the boldest of all tropes; for it exceeds the strict bounds of truth, and represents things either greater or less, better or worse, than they really are. But the representation is made in such a manner as not to impose on the hearers. For an *hyperbole* is not used to define or describe any thing accurately, but only to magnify or deprecate it in a considerable degree, when we either cannot or do not choose to represent it exactly. The excess in this trope is called *auxesis*; as when we say of any thing that is very high, *it reaches to the skies*. The defect, or contrary extreme, is termed *meiosis*: So we say of a very lean person, *he is nothing but skin and bones*, or a mere *skeleton*. It is principally metaphorical, but sometimes taken from other tropes. When Saul and Jonathan are said to have been *swifter than eagles*, and *stronger than lions*, the expression is founded in similitude, and is therefore a metaphor. When, instead of saying Cato was a very virtuous man, the historian calls him *the image of virtue*; it is an hyperbolical metonymy of the adjunct for the subject. And when we read in the Mosaic history of *cities fenced up to heaven*, there is a *synecdoche*. But if a man of weak sight be said to be *eagle-eyed*, it is an *irony*. Those hyperboles which are expressed comparatively, are commonly most em-

phatical, because they shew a peculiarity in the excess. To say a thing is *as light as a feather*, carries the idea very far; but to say it is *lighter*, not only carries it still farther, but also heightens it, by leaving the mind at an uncertainty where to fix the limits.

VII. Sometimes two or more tropes, and those of a different kind, are contained under one word; so that several gradations, or intervening fences, come between the word that is expressed, and the thing designed by it. And this is called a *metalepsis*. The contests between Sylla and Marius proved very fatal to the Roman state. Julius Cæsar was then a young man. But Sylla observing his aspiring genius, said of him, "In one Cæsar there are many Mariuses." Now in this expression there is a *metalepsis*. For the word *Marius*, by a *synecdoche*, or *antonomasia*, is put for any ambitious and turbulent person; and this again, by a *metonymy* of the cause, for the ill effects of such a temper to the public. So that Sylla's meaning, divested of these tropes was, that Cæsar would prove the most dangerous person to the Roman state that ever was bred in it: Which afterwards proved true in the event. So when Virgil, describing that part of the African coast where Æneas arrived with his ships, says, *A dark wood hung over it*; the word *dark*, by a metonymy of the effect, is put for *shady*, and that again by the same trope for *thick*; for his meaning is, a *thick wood*. But the words of Dido, in the same poet, contain a larger gradation, when she says,

Happy, ah truly happy had I been,
If Trojan ships our coasts had never seen.

In which expression, first by a metonymy of the adjunct, the ships are put for the Trojans in the ships; and these, by a *synecdoche* of the whole, for Æneas, who was one of them; and again, his arriving on the coast, by a metonymy of the cause, for her seeing him; and lastly, her seeing him, by the same trope, for the passion she had for him. So that her meaning is, she had been happy, if she had never entertained a passion for Æneas. This trope is more frequently to be met with in poets than in orators, as they take greater liberty in using distant allusions than is suited to that perspicuity of expression which is required in oratory. But as Quintilian has well observed, all the intermediate links of the chain in this trope are of no further use than to lead the mind gradually from the first to the last, the better to perceive their connection. As in the example last mentioned, relating to Dido, if we drop all the intervening steps, and connect the words expressed with what is directly intended, they will be found to contain a very remote cause put for the effect, which comes under a *metonymy*. On the contrary, in the second example, where *dark* stands for *thick*, the effect is put for a remote cause. And the first, which is founded in a similitude of temper between Cæsar and Marius, belongs to a *metaphor*.

VIII. *Allegory*. As a *metalepsis* comprises several tropes in one word, so this is a continuation of several tropes in one or more sentences. Thus Cicero says, "Fortune provided you no field, in which your virtue could run and display itself;" Where the words *field* and *run* are metaphors taken from corporal things, and applied to the mind. And in another passage, speaking of himself, he says, "Nor was I so timorous, that after I had steered the ship of the state through.

through the greatest storms and waves, and brought her safe into port, I should fear the cloud of your forehead, or your colleague's pestilent breath. I saw other winds, I perceived other storms, I did not withdraw from other impending tempests; but exposed myself singly to them for the common safety." Here the state is compared to a ship, and all the things said of it under that image are expressed in metaphors made use of to signify the dangers with which it had been threatened. And indeed allegories generally consist of metaphors; which being the most beautiful trope, a number of them well chosen and put together is one of the finest and brightest ornaments in language, and exceeds a single metaphor in lustre, as a constellation does a separate star. It is true, that allegories are sometimes found in other tropes; but this is very rare. In that known expression of Terence, the tropes are all metonymies: *Without Ceres and Bacchus Venus grows cold*; that is, divested of the tropes, *Without meat and drink, love dies*. And Samson's riddle is made up of synecdoches; "Out of the eater came forth meat, and out of the strong came forth sweetness." But there is no small skill required in the right management of allegories. For care should be taken, that the same kind of trope be carried through the whole, so as to compose one uniform and consistent set of ideas: otherwise they dress up a chimera, a thing that has no existence, and of which the mind can form no perception. And, as Quintilian says very justly, "to begin with a tempest and end with a fire, would be very ridiculous and unnatural." It is likewise very necessary that the allusions be all plain and evident, especially where the name of the thing alluded to is not expressed. These are called *pure allegories*. As that of Cicero: "So it happens, that I, whose business it is to repel the darts, and heal the wounds, am obliged to appear before the adversaries have thrown any dart; and they are allowed a time to attack us, when it will not be in our power to avoid the assault; and if they throw a poisonous dart, which they seem prepared to do, we shall have no opportunity to apply a remedy." The tropes here are all taken from military affairs, without any intimation what they are applied to. But that is plain from the context of the discourse. For he is speaking of the disadvantages he laboured under in defending his client against those of the opposite side, and so applies to the bar those terms which were proper to the field. But where the reference is not evident, it becomes a riddle; which is nothing else but an obscure allegory. To avoid this, therefore, the best writers generally use what they call *mixed allegories*; that is, such wherein the proper name of the thing is expressed, which the whole similitude respects. Of this kind is that in the speech of king Philip of Macedon, given us by Justin, where he says, "I perceive that cloud of a dreadful and bloody war arising in Italy, and a thunder-storm from the west, which will fill all places with a large shower of blood, wherever the tempest of victory shall carry it." The proper words *war, blood, and victory*, being joined to the tropes *cloud, shower, and tempest*, in this sentence, render the several parts of the similitude plain and evident. Quintilian thinks those allegories most beautiful, where the whole similitude is expressed, and those words, which in their proper sense relate to one

of the two things between which the comparison is made, are allegorically applied to the other: As when Cornelius Nepos says of Atticus, "If that pilot gains the greatest reputation who prefers his ship in a boisterous and rocky sea; ought not he to be thought a man of singular prudence, who arrived in safety through so many and so great civil tempests?" These are the allegories with which orators are chiefly concerned.

§ 2. Of Figures.

This term seems to have been borrowed from the stage, where the different habits and gestures of the actors, suitable to the several characters they sustained, were by the Greeks called *σχηματα*, and by the Latins *figuree*: And it is not unusual with us to say of a person, both with respect to his dress and action, that he makes a *very bad*, or a *very graceful*, figure. And as language is the dress, as it were, of our thoughts, in which they appear and are represented to others; so any particular manner of speaking, may in a large sense of the word be called its *figure*, in which latitudes writers sometimes use it. But rhetoricians have restrained the sense of the word to such forms of speech as differ from the more common and ordinary ways of expression; as the theatrical habits of actors, and their deporement on the stage, are different from their usual garb and behaviour at other times. A figure therefore, in the sense it is used by rhetoricians, is, *A mode of speaking different from, and more beautiful and emphatical than, the ordinary and usual way of expressing the same sense*. Now as the habits and gestures of our bodies are in a manner infinitely variable, so it is plain that the different forms of speech are almost innumerable. But every alteration from the common manner ought not to be esteemed a figure, nor deserves that character. It must contain some beauty, or express some passion, to merit a place among rhetorical figures, and be marked out for imitation.

The subject of figures seems to have been one of the last things which was brought into the art of oratory in order to complete it. Aristotle, who treats so accurately upon other parts, says very little of this. But the Greek writers who came after him have abundantly supplied that deficiency. It is to them we owe the chief observations, that have been made on this subject. They took notice of the several modes and turns of expression, observed their force and beauty, and gave them particular names by which they might be known and distinguished from each other. And indeed they have treated the matter with that minuteness and subtilty, that Quintilian seems, not without reason, to think they have multiplied figures to an excess. But though it was so late before they were taken notice of, and introduced into the art of speaking; yet the use of them in discourse was doubtless very ancient. The author of Homer's life, which some have ascribed to Plutarch, has shewn, by examples taken out of him, that there is scarce a figure mentioned by rhetoricians, but is to be met with in that most ancient poet. And, if we consider the nature of speech, we shall easily perceive that mankind must have been under a necessity very early to introduce the use of tropes for supplying the want of proper words to express their simple ideas: so the like necessity must have

have put them upon the use of figures to represent their different passions. Tho' both of them were afterwards increased, and improved in such a manner as to become the chief ornaments of language. The passions of men have been always the same; they are implanted in us by nature, and we are all taught to discover them by the same ways. When the mind is disturbed, we shew it by our countenance, by our actions, and by our words. Fear, joy, anger, alter the countenance, and occasion different emotions and gestures of the whole body. And we know with what passion a man is affected, by hearing his words, though we do not see him. He does not express himself as he usually does at other times when cool and sedate. Objects appear to him in a different view, and therefore he cannot but speak of them in a different way. He interrogates, he exclaims, he admires, he appeals, he invokes, he threatens, he recalls his words, repeats them, and by many other different turns of expression varies his speech, no less than his countenance, from his common and ordinary manner. Now as nature seems to teach us by these figurative expressions how to represent the different commotions of our minds, hence some have thought fit to call figures *the language of the passions*. And as these are given us, among other wise ends, to excite us the better to provide for our preservation and safety, this is done sometimes by force of arms, and at other times by discourse. And therefore Cicero very handsomely compares the conduct of an orator to the exercises of the palestra: in which, as each combatant endeavours not only to defend himself, and attack his adversary, but likewise to do both with decency; so the principal weapons of an orator, as he represents them, are figures, which being no less the ornaments of language than images of our passions, answer all these purposes. Besides, figures chiefly distinguish the different kinds of style, furnish it with an agreeable variety, and often serve to represent things in a clear and forcible manner.

From this short account of the nature of figures, the advantage of them to an orator is very evident. They are a sort of natural eloquence, which every one falls into without attending to it, suitably to that temper of mind, with which he is affected himself, and is desirous to affect others. In a cool and sedate discourse, such figures as convey our sentiments with the greatest strength and evidence are most proper. And there are others, which are suited to brighten and enliven more gay and sprightly subjects. Others again are more peculiarly adapted to express the disorders and perturbations of the mind. To repeat the same thing again would many times be deemed a tautology and impertinent; but to do this when the mind is ruffled, is not only allowable, but the repetition renders it more strong and affecting. So likewise to interrogate, exclaim, or admire, under the influence of a passion, impresses the hearers, and disposes them to attention; whereas at another time perhaps such ways of speaking would scarce be consistent with prudence. There is a natural sympathy in mens minds, which disposes them to receive impressions from those with whom they converse. Thus one gay and pleasant companion gives a cheerfulness and vivacity to a whole company; whereas on the contrary, one who is dull and slegmatic damps the spirits of all about

him, and affects them with the same gloomy temper. Elocution. Figures are peculiarly serviceable to an orator for answering these different intentions. And as he finds them in life, from thence he must copy them; as a painter does the features of the countenance, and the several parts of the body; figures being to the one what lines and colours are to the other. The design of Catiline to destroy the Roman state and burn the city, is a story well known. There was an army drawn together at a proper distance to favour the undertaking; and others were left in Rome, who had their parts assigned them for burning the city, and destroying those who should escape the flames. And in a word, every thing was ready for putting in execution this horrid and barbarous scheme. So that nothing retarded it but the taking off Cicero, who was then counsellor, which was thought necessary to be done first. Cicero, upon information of the design against his life, finds means to prevent it, and the same day calls together the senate. And Catiline, who was a man of consummate boldness, had the confidence to appear in that assembly. Upon their meeting, Cicero opens to them the whole affair of the conspiracy, and the design against himself, in a most warm and pathetic harangue. In which he had two things in view; to raise the indignation of the senate against the conspirators, and particularly against Catiline; and, either by terrifying or exasperating him, to oblige him to leave the city. Now he does not begin this speech in his usual manner at other times, by addressing to his audience, bespeaking their favour and attention, or letting them gradually into the design of what he was about to say; but as Catiline was present, he immediately falls upon him with vehemence, in the following manner: "How far, Catiline, will you abuse our patience? How long will your fury insult us? What bounds will you set to your unbridled rage? Does neither the night guard of the palace, nor the city watch, nor the peoples fear, nor the agreement of all good men, nor the meeting of the senate in this fortified place, nor the countenances and looks of this assembly, at all move you? Do not you perceive your designs are discovered, and that all who are present know of your conspiracy? Who of us do you think is ignorant of what you did the last night, and the night before, where you was, who were with you, and what you resolved on? O times, O manners! The senate knows this, the consul sees it; and yet this man lives!—lives? nay, comes into the senate, joins in the public counsels, observes and marks out each of us for destruction!" And in the same impetuous strain he proceeds through his whole speech, interpersing a great variety of the like strong and moving figures. And the discourse had its desired effect: for when Catiline stood up afterwards to make his defence, the whole senate was so inflamed, and their resentments against him rose so high, from what Cicero had said, that they had not patience to hear him speak; upon which he left both them and the city. Had Cicero, instead of venting his just indignation against the author of so barbarous and inhuman a design, in the manner he did, by figures suited to strike the passions of his hearers; had he, instead of this, attempted to reason with him, and told the story in a cold and lifeless manner, he would have

exposed himself to the contempt of Catiline; and by leaving the senate little or nothing moved at what he said, prevented perhaps their coming to those speedy and vigorous resolutions which were necessary at so critical a juncture. Let us suppose him to have expostulated with Catiline in much the same words as before, but thrown into a different form, and diversified of those pathetic figures. As thus: "Catiline, you have really abused our patience to a great degree. You have insulted us with your furious proceedings a long while. You seem to have fixed no bounds to your unbridled rage. Neither the night-guard of the palace, nor the city-watch, nor the peoples fear, nor the agreement among good men, nor the calling together of the senate in this fortified place, nor the countenances and looks of this assembly, appear to move you in the least. I assure you we are all of us apprised of what you did the last night, and the night before, where you was, and who were with you, and what resolutions you came to. These are sad times, the age is very degenerate; that the senate should know all this, the consul see it; and yet that this man should live, come into the senate, hear all our debates, and mark us out to destroy us." You see the sense is entirely the same, and the words too in a great measure; so that there is little more than an alteration in the form of them. And yet who does not perceive how flat and languid such a way of talking must have appeared at that time? and how much it loses of that spirit and energy, which shews itself in Cicero's manner of expression? Had he delivered himself thus, it might indeed have made the senate look upon Catiline as an abandoned wretch, lost to all virtue and goodness, and perhaps have moved some to pity him on that account; as we are easily induced to compassionate persons in such circumstances, especially when descended from noble and virtuous ancestors, which was his case. But sure it would have been ill suited to fire their minds with that generous regard for their country, and the necessary precautions for its security, which the circumstances of the state then required. Nor would Catiline have been at all deterred by it, but rather encouraged in the prosecution of his designs, from the little effect a speech so managed must probably have had upon the minds of the senators. But Cicero knew very well, that the passions of mankind are the springs of action: that it is many times not sufficient for an orator to convince their minds, by setting the truth in a clear light; but he must also raise their hopes, alarm their fears, inflame their anger, or excite some other suitable passion, before they will be brought to act with that zeal and fervour, which the case may require. And as he was admirably well skilled in this art of touching the passions, he seldom fails to fix upon the proper methods of doing it, and makes choice of such figures and modes of speaking as in the strongest manner represent the emotions of his own mind. For every passion is not to be expressed by the same figures, any more than it is drawn by the same lines, or painted with the same colours. When Dido finds that Æneas is about to leave her, she uses all her arts to detain him. And as persons in great distress are seldom at a loss to express their condition in the most affecting way; she discovers her fear, anger, revenge, with the whole crowd of disorders

which then possessed her mind, in a variety of moving figures, suited to raise the counter passions in his breast, as is finely represented by Virgil in that artful speech he has made for her, which we forbear to recite for no other reason but the length of it. But what particular figures are most accommodated to answer the several ends proposed by them, will best appear when we come to treat of them separately.

We shall therefore now proceed to lay down a few directions for the proper use of figures. And first they should always be accommodated to the sentiments, and rise in proportion to the images designed to be conveyed by them. So far as they are founded in reason, they are suited to impress the mind; but where the language outstrips the thought, though it may please the ear, and some weak persons may be carried away with a pomp of words, yet an intelligent hearer will soon see through the thin and airy dress. It is the sense which gives weight to the figure, as that by striking the imagination awakens the mind, and excites it to act in conformity to reason. Again, in the use of pathetic figures, it is generally better to be nervous than copious, that the images, by their closer union, may impress the mind with greater force and energy; though in such figures as are designed for ornament or illustration, a more diffusive way of painting is sometimes agreeable. But farther, the too frequent use of figures ought to be avoided. For what was observed in relation to tropes, is also true with respect to these; that a great number of them is apt to darken and obscure the style. And besides, Cicero's reflection in this case is very just, That "it is hard to say, what should be the reason, that those things, which most affect us with a sensible pleasure, and at first sight soonest move us, do likewise soonest cloy and satiate us." But that it is so, we find by common experience. Lastly, figures should be so interwoven in a discourse, as not to render the style rough and uneven, sometimes high and at other times low; now dry and jejune, then pompous and florid. In a word, they should rather seem to arise from nature than art; to offer themselves, than to be the effect of study; and to appear not like patches upon a face, but the agreeable beauty of a sound and healthful complexion. But of this we shall have occasion to speak more at large hereafter, in treating upon the different kinds or characters of style.

As to the division of figures, which is what remains to be considered, they are usually divided into two sorts, figures of words, and figures of sentences. The difference between them consists in this; that in the former, if you alter the words, or sometimes only the situation of them, you destroy the figure; but in the latter the figure remains, whatever words are made use of, or in what manner soever the order of them is changed. Thus when the name of a person or thing is repeated, to intimate some known property or quality belonging thereto, it is a verbal figure called *place*. Cicero was a true patriot and hearty lover of his country. And therefore we shall use this figure in saying, that *at the time of Catiline's conspiracy Cicero appeared like Cicero*. The sense would remain the same, but the figure would be lost, if we should alter the words, and say, *at that time Cicero appeared like himself*. So when two or more sentences,

Elocution.

Elocution.

or members of a sentence, end with the same word, it is called *epistrophe*; as when we say, *To lose all relish of life, is in effect to lose life*. But if only the order of the words be changed in the latter clause thus, *To lose all relish of life, is to lose life in effect*; the figure vanishes. And this is the nature of the verbal figures. But it is not so in figures of sentences; they continue the same, whatever alterations are made in the words. An orator sometimes thinks it proper to change the form of his discourse, and address himself to his audience, or an absent person, or else perhaps to introduce some other person as speaking to them. whose words may be supposed to carry greater weight and authority than his own. The former of these is called *apostrophe*, and the latter *prosopeia* or *imagery*; which require no certain words, or order of expression.

ART. I. VERBAL FIGURES.

THESE may be distinguished into three sorts, as they consist in a deficiency of words, a redundancy, or a repetition.

62 I. Of the first sort are *ellipsis* and *asyndeton*.

Ellipsis, is when one or more words are wanting in a sentence, to complete the construction, and fully express the sense. This figure is often used in proverbial speeches: as when we say, *Many men, many minds*: that is, *have many minds*; and, *The more danger, the more honour*, that is, *gains more honour*. But where more is intended by such expressions than mere brevity, and especially when they are the effect of some passion, the figure receives another name, and is called *apostrophesis*, which is placed among the figures of sentences, where we shall consider it.

63 *Asyndeton*, is when the particles that connect the members of a sentence one with another are left out, to represent either the celerity of an action, or the haste and eagerness of the speaker. Thus Cæsar expresses his speedy conquest of Pharnaces: *I came, I saw, I conquered*. If he had inserted the copulatives, and said, *I came, and I saw, and I conquered*: it would have retarded the expression, and not given so full and just an idea of the swiftness of the action. In the last article we took notice of the vehement and impetuous manner in which Cicero attacked Catiline in his first oration, where his design was to fire the minds of the senate against him, and oblige him to leave the city; both which points he gained by that speech. The next day therefore, when Catiline was gone, he calls together the body of the citizens, and makes a speech to them, which in a sort of rapture or transport of mind he thus begins, by acquainting them with the departure of Catiline, *He is gone, departed, escaped, broke out*; intimating at the same time both the excessive rage in which Catiline left Rome, and the great pleasure with which he was himself affected on that account. This concise way of speaking adds likewise a considerable emphasis to an expression, and by bringing the several parts of a thing nearer together affects the mind with greater force. Thus Cicero sets Cato's character in a very strong and beautiful light by the use of this figure. "Nature itself (says he) has made you a great and excellent man for integrity, gravity, temperance, magnanimity, justice, in a word, for all virtues."

II. The second sort of verbal figures is contrary to these, and consists in a redundancy or multiplicity of words; which are likewise two, *pleonasmus* and *polyndeton*.

When we use more words than are necessary to express a thing, it is called *pleonasmus*. This is done sometimes for greater emphasis, as when we say, *Where in the world is he?* At other times it is designed to ascertain the truth of what is said: So the servant in Terence, when the truth of what he had related was called in question, replies, *It is certainly so, I saw it with these very eyes*.

When the several parts of a sentence are united by proper particles, it is called *polyndeton*. This adds a weight and gravity to an expression, and makes what is said to appear with an air of solemnity; and by retarding the course of the sentence, gives the mind an opportunity to consider and reflect upon every part distinctly. We often meet with this figure in Demosthenes, which very well suits with the gravity of his style. So he encourages the Athenians to prosecute the war against king Philip of Macedon, from this consideration, that now "they had ships, and men, and money, and stores, and all other things which might contribute to the strength of the city, in greater number and plenty than in former times. Every article here has its weight, and carries in it a proper motive to animate them to the war. And if you remove the copulatives, the sentence will lose much of its force.

III. The third kind of verbal figures consist in a repetition. And either the same word in sound or sense, is repeated; or one of a like sound, or signification, or both.

Of the former sort there are ten, called *antanaclasis*, *place*, *epizeuxis*, *climax*, *anaphora*, *epistrophe*, *symplace*, *epanalepsis*, *anadiplosis*, and *epanodos*. The two first of these agree in sound, but differ in sense; the eight following agree in both.

When the same word in sound but not in sense is repeated, it is called *antanaclasis*. This figure sometimes carries a poignancy in it; and when it appears natural and easy, discovers a ready turn of thought. As when a son, to clear himself of suspicion, assured his father *he did not wait for his death*; his father replied, *But I desire you would wait for it*. Here the word *wait* is taken in two different senses. It is likewise used on serious occasions, as in grave and moral precepts, which are apt to affect the mind with greater pleasure when delivered in an agreeable dress. As this; *Care for those things in your youth, which in old age may free you from care*: Where the word *care* in the former place signifies to provide, and in the latter anxiety of mind. And even our Saviour himself once uses this figure, when he says to one of his disciples, who desired to be dismissed from attending him that he might go and bury his father; *Follow me, and let the dead bury their dead*: Where dead in one place denotes a natural death, and in the other a moral or spiritual death.

Sometimes the name of some person or thing is repeated again, to denote some particular character or property designed to be expressed by it; and then it is called *place*. Thus Cicero says, *Young Cato wants experience, but yet he is Cato*; meaning he had the

Elocution. steady temper of the family. And so in the proverbial expression: *An ape is an ape, dress him ever*

so fine.

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When a word is repeated again with vehemence in the same sense, it is called *epizeuxis*. This figure shews the earnestness of the speaker, and his great concern of mind about what he says; and therefore has a natural tendency to excite the attention of the audience. It is suited to express anger, surprize, sorrow, and several other passions. As when Cicero would express his indignation against Anthony for having been the chief instrument in bringing on the civil war, he says to him: *You, you, Anthony, pushed Cesar upon the civil war.* And thus he tells Catiline in his first invective against him: *You live; and live, not to lay aside, but to pursue, your wicked design.* And when our Saviour would express his great concern and sorrow for the wickedness of the Jews, he does it in this pathetic manner: *O Jerusalem, Jerusalem, who killest the prophets!*

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Climax, is a beautiful kind of repetition, when the word, which ends the first member of a period, begins the second, and so through each member, till the whole is finished. There is a great deal of strength as well as beauty in this figure, where the several steps rise naturally, and are closely connected with each other. As in this example: *There is no enjoyment of property without government, no government without a magistrate, no magistrate without obedience, and no obedience where every one acts as he pleases.* But, as Quintilian observes, this figure lies so open, that it is apt to look too much like art; for which reason he advises not to use it often. To prevent this, therefore, orators sometimes disguise it, by not repeating the same word which stood in the former member, but some other equivalent to it. As in the following instance of Cicero for Milo: "Nor did he commit himself only to the people, but also to the senate; nor to the senate only, but likewise to the public forces; nor to these only, but also to his power with whom the senate had entrusted the whole commonwealth."

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When several sentences, or members of a sentence, begin with the same word, it is called *anaphora*. This is a lively and elegant figure, and serves very much to engage the attention. For by the frequent return of the same word the mind of the hearer is held in an agreeable suspense, till the whole is finished. "You do nothing, (says Cicero to Catiline,) you attempt nothing, you think nothing, but what I not only hear, but also see, and plainly perceive." It is frequently used by way of question; which renders it not only beautiful, but likewise strong and nervous. As at the beginning of the same speech: "Does neither the night-guard of the palace, nor the city-watch, nor the peoples fear, nor the agreement of all good men, nor the meeting of the senate in this fortified place, nor the countenances and looks of this assembly, at all move you?" And in another of his orations: "What is so popular as peace, which seems to afford a pleasure, not only to beings endowed with sense, but even to inanimate nature? What is so popular as liberty, which even beasts as well as men seem to covet and prefer above all things? What is so popular as ease and leisure, for the enjoyment of which you

and your ancestors have undergone the greatest labours?"

Epistrophe, is contrary to the former, and makes the repetition at the end of each member or sentence. As thus: *Since concord was lost, friendship was lost, fidelity was lost, liberty was lost, all was lost.* And Cicero, in the charge which he brings against Mark Anthony before the senate, makes use of this figure, when he says, "Do you lament the destruction of three Roman armies? The author of that destruction was Anthony. Do you bewail the loss of most eminent citizens? They have been taken from you by Anthony. Is the authority of this order weakened? It is weakened by Anthony."

Symplexe takes in both these last figures. As in that of Cicero: "You would pardon and acquit him, whom the senate hath condemned, whom the people of Rome have condemned; whom all mankind have condemned." Here the several members both begin and end with the same word. We have a beautiful instance of it in St Paul, when he says: "Are they Hebrews? so am I. Are they Israelites? so am I. Are they the seed of Abraham? so am I."

When a sentence concludes with the word with which it began, it is called *epanalepsi*. As in that expression of Plautus, "Virtue contains all things, he wants no good thing who has virtue." The figure is the same, but the principle not so honest, in the advice which we find given by the miser in Horace, when he says, "Get money if you can, honestly; but however, get money." This figure adds a force to an expression, when the principal thing designed to be conveyed is thus repeated, by leaving it last upon the mind. And it heightens the beauty of it, when the sentence has an agreeable turn arising from two opposite parts. As in Cicero's compliment to Cesar: "We have seen your victory terminated by the war; your drawn sword in the city we have not seen." Herodotus calls this a *circle*, because the sentence returns again to the same word, as that geometrical figure is formed by the orbicular motion of a line to the same point.

When the following sentence begins with the same word with which the former concluded, it is termed *anadiplosis*. As in the following instance: *Let us think no price too great for truth; truth cannot be bought too dear.* So in that passage of St John: *He came to his own, and his own received him not.* This figure generally suits best with grave and solemn discourses.

Epanodos, is the inversion of a sentence, or repeating it backwards, so that it takes in the two last figures; for it both begins and ends with the same word, and the same word is likewise repeated in the middle. This turn of expression has a beauty in it, and shews a readiness of thought. We have the following example of it in Minutius Felix, where he is exposing the folly of the Egyptian superstition. "Isis (says he) with Cy-noccephalus and her priests, laments, bemoans, and seeks her lost son; her attendants beat their breasts, and imitate the grief of the unhappy mother; in a little time the son is found, upon which they all rejoice. Nor do they cease every year to lose what they find, or to find what they lose. And is it not rid-

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Execution. diculous to lament what you worship, or to worship what you lament?" It serves likewise to illustrate and enforce the sense, by setting it in two opposite views. As in that expression of the prophet: "Wo unto them that call good evil, and evil good; who put darkness for light, and light for darkness!"

Those figures which consist in a repetition of words of a like sound or signification, or both, are four; *paronomasia*, *homoeoptoton*, *synonymia*, and *derivatio*; the two first of which respect words that are similar in sound only, the third in sense, and the last in both.

When two words very near in sound, but different in sense, respect each other in the same sentence, it is called *paronomasia*. As when we say, *After a feast comes a fast*; and, *A friend in need is a friend indeed*. We usually call it a *pun*; which when new, and appositely used, passes for wit, and serves to enliven conversation. Nor is it wholly to be excluded from grave and serious discourses: for a witty jest has many times had a better effect than a solid argument, and prevailed with those who could not be moved by close reasoning. And therefore Cicero and the best speakers have sometimes recourse to it upon weighty and solemn occasions, as will be shewn hereafter in its proper place.

When the several parts of a sentence end with the same case, or sense of a like sound, this also is considered as a figure, and named *homoeoptoton*. As thus: *No marvel though wisdom complains that she is either wisely despised, or carelessly neglected; either openly scorned, or secretly abhorred*. This figure is esteemed most beautiful when the parts are all of the same length, or pretty near it; as it adds to the harmony of the period, and renders the cadency of the several members more musical from the just proportion between them. The Greek rhetoricians were much addicted to this figure, and Isocrates is particularly celebrated for it. But some of the best orators seem to have industriously avoided it, as carrying in it too much the appearance of art. And it is remarkable, that this figure appears nowhere so much in all the works of Demosthenes, as in an oration, which he did not speak himself, but wrote for his friend Diodorus, a man of that taste, who was to pronounce it as his own.

The next figure above-mentioned is *synonymia*. Now strictly speaking, synonymous words are those which have exactly the same sense. But there being few such, the use of the term is so far extended as to comprehend words of a near affinity in their signification, which in discourse are frequently put for one another. So, *to desire*, and *to treat*, are sometimes used as equivalent terms; whereas *to desire* is no more than to wish for a thing, and *to treat* is to express that inclination in words. In like manner, *esteem* and *honour*, are often taken for synonymous words, though they have not precisely the same sense, but one is the usual consequence of the other; for esteem is the good opinion we entertain of a person in our mind, and honour the outward expression of that opinion. When two or more such words come together, they constitute this figure. As when Cicero speaking of Piso says, "His whole countenance, which is the tacit language of the mind, has drawn men into a mistake, and deceived, cheated, imposed on those who did not

know him." This figure sometimes adds force to an expression, by enlivening the idea; and it often promotes the harmony and just cadency of a sentence, which otherwise would drop too soon, and disappoint the ear.

When such words as spring from the same root, as *justice*, *just*, *injustice*, *unjust*, and the like, come together in the same sentence, they make the figure called *derivatio*. Cicero observing the vanity of the philosophers, who affected praise at the same time that they derided it, uses this figure, when he says of them, "The philosophers set their names to those very books which they write for the contempt of glory; and are desirous to be honoured and applauded, even for what they say in contempt of honour and applause." This figure receives an additional beauty when repeated, especially in two opposite members; as, *He wished rather to die a present death, than to live a miserable life*.

ART. II. FIGURES OF SENTENCES.

Of these, some are principally adapted for reasoning, and others to move the passions.

I. *Those suited for proof*. Which are six: *Prolepsis*, *hypobole*, *anacoinosis*, *epitrope*, *parabole*, and *antitrope*.

Prolepsis, or *anticipation*, is so called, when the orator first starts an objection, which he foresees may be made either against his conduct or cause, and then answers it. Its use is to foretell an adversary, and prevent his exceptions, which cannot afterwards be introduced with so good a grace. Though it has likewise a farther advantage, as it serves to conciliate the audience, while the speaker appears desirous to represent matters fairly, and not to conceal any objection which may be made against him. The occasions of this figure are various; and the manner of introducing it very different. Sometimes the orator thinks it necessary to begin with it, in order to justify his conduct, and remove any exceptions which may be made against his design. Cicero for several years together, after he first began to plead, had always been for the defendant in criminal cases. And therefore, when he was prevailed with to undertake the accusation of Verres, he begins his oration with this apology for himself: "If any one present should wonder, that when for several years past I have so conducted myself as to defend many and accuse none, I now on a sudden alter my custom, and undertake an accusation; when he shall have heard the occasion and reason of my design, he will both approve of it, and think no person so proper to manage this affair as myself." And then he proceeds to give an account of the reasons which moved him to engage in it. At other times the objection is admitted as an exception to what has been said, but not so as to affect it in general. Thus, when Cicero has represented the advantages of literature and the polite arts, he starts this objection to what himself had said, "But some one will ask, whether those great men, the memory of whose glorious actions is delivered down to posterity, were acquainted with that sort of learning I so applaud?" To which he replies, "Indeed this can scarce be said of them all. However, the answer is easy. I have known several persons of excellent abilities, who, without learning, by the force of an extraordinary ge-

nus, have been men of great virtue and solidity. Nay I will add, that nature without learning, has oftener produced these qualifications, than learning without a genius. But yet it must still be owned, that where both these meet, they form something very excellent and singular." Again, at other times, the orator artfully represents the objection as something considerable and important, to give the greater weight to his answer when he has confuted it. Cicero, in his celebrated oration for the Manilian law, could not omit to take notice, that Lucullus had already gained several very considerable advantages over Mithridates. And therefore, having before described the war as very great and dangerous, apprehending these two accounts might appear somewhat inconsistent, and be liable to an objection; he puts it thus artfully himself: "But now, after what I have said of Lucullus, it may probably be asked, How then can the war be so great? Be pleased to hear, for there seems to be very just reason for this question." And then he proceeds to shew, from the power of king Mithridates at that time, his great abilities, long experience in military affairs, and fresh alliances, that the war was yet very great and dangerous. But sometimes, when the orator is sensible that what he has advanced lies open to an objection, he omits to make it in express terms; and yet proceeds to vindicate what he had said, as if it had been made. Thus, when Cicero had charged Verres with having plundered the inhabitants of Sicily of all their plate, jewels, and other valuable moveables, which he thought worth while to carry away; as the audience might imagine this to be scarce credible, he takes it for granted they thought so; and therefore immediately adds, "As strange as this is, I affirm it positively, without any intention to aggravate the crime." And so he goes on to the proof of his assertion. But this figure is likewise made use of to guard against some objection, which the speaker apprehends may be made against what he designs to say. And thus Cicero uses it in his oration for Sextius. "My province, (says he) as I speak last, seems to call for affection to my friend, rather than his defence; complaint, rather than eloquence; expressions of grief, rather than art. And therefore, if I shall express myself with more warmth, or greater freedom, than those who have spoke before me, I hope you will grant me all that liberty of speech which you judge reasonable to be allowed to an affectionate sorrow, and just resentment." This figure requires great prudence and discretion in the management of it. The speaker must consider well the temper, bias, and other circumstances of his hearers, in order to form a right judgment what parts of his discourse may be most liable to exception. For to object such things, which the hearers would never have thought of themselves, is to give himself a needless trouble; and to start such difficulties, which he cannot afterwards fairly remove, will expose both himself and his cause. But as nothing gives an audience greater pleasure and satisfaction, than to have their scruples fully answered as they rise in their thoughts; so on the contrary, be a discourse otherwise ever so entertaining and agreeable, if there be any doubt left upon the minds of the hearers, it gives them a pain that continues with them till it be removed.

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like the former; and is, when several things are mentioned that seem to make for the contrary side, and each of them refuted in order. It consists of three parts, when complete; a proposition, an enumeration of particulars with their answers, and a conclusion. Thus, Cicero upon his return from banishment, vindicates his conduct in withdrawing so quietly, and not opposing the faction that ejected him. "My departure (says he) is objected to me, which charge I cannot answer without commending myself. For what must I say? That I fled from a consciousness of guilt? But what is charged upon me as a crime, was so far from being a fault, that it is the most glorious action since the memory of man, (he means his punishing the associates of Cataline.) That I feared being called to an account by the people? That was never talked of; and if it had been done, I should have come off with double honour. That I wanted the support of good and honest men? That is false. That I was afraid of death? That is a calumny. I must therefore say, what I would not, unless compelled to it, that I withdrew to preserve the city." When the objections are put by way of question, as in the example here given, they add a briskness and poignancy to the figure. All the parts of it are not constantly expressed. For thus Cicero in his defence of Plancius introduces his adversary objecting, and himself answering, "The people judged ill, but they did judge; they should not have done it, but they had a power; I cannot submit to it, but many very great and wise men have." Both the proposition and conclusion are here omitted.

The next figure in order is *anacoinosis*, or *communication*; by which the speaker deliberates either with the judges, the hearers, or the adversary himself. Thus Cicero addresses the judges in his accusation of Verres: "Now I desire your opinion, what you think I ought to do. And I know your advice will be, though you do not declare it, what appears to me necessary to be done." In another place we find him reasoning in this manner with the adverse party: "What could you have done in such a case, and at such a time; when to have sat still, or withdrawn, would have been cowardice? When the wickedness and fury of Saturninus the tribune had called you into the capitol; and the consuls, to defend the safety and liberty of your country; whose authority, whose voice, which party would you have followed, and whose command would you have chosen to obey?" This figure carries in it an air of modesty and condescension, when the speaker seems unwilling to determine in his own cause, but refers it to the opinion of others. It likewise shews a persuasion of the equity of his cause, that he can leave it to their arbitration; and serves very much to conciliate their minds, while he joins them, as it were, with himself, and makes them of his party. And when the appeal is made to the adverse party, it is of considerable advantage, either to extort a confession, or at least to silence him. And therefore the sacred writers sometimes very beautifully introduce God himself thus expostulating with mankind; as the prophet Malachi, *A son honoureth his father, and a servant his master. If then I be a father, where is mine honour? and if I be a master, where is my fear?*

Another figure that comes under this head, is

oration.

epitrope or *concession*; which grants one thing, to obtain another more advantageous. It is either real or feigned; and either the whole of a thing, or a part only, is granted. We shall consider each of these separately, and illustrate them with proper examples. Nothing more confounds an adversary, than to grant him his whole argument; and at the same time either to shew that it is nothing to the purpose, or to offer something else which may invalidate it. *I allow*, says the claimant by will against the heir at law, *that no body was more nearly related to the deceased than you; that he was under some obligations to you; that you were in the army together: but what is all this to the will?* And thus Cicero in his defence of Ligarius, who was accused by Tubero for having joined with Pompey in the civil war between him and Cæsar: "You have, Tubero, what an accuser would most desire, the accused person confessing the charge; but so as to affirm, that he was of the same party with you and your excellent father. Therefore own first that it was a crime in yourself, before you charge it as such upon Ligarius." Sometimes the orator gives up some particular point that would well admit of a dispute, to gain something more considerable, which he thinks cannot fairly be denied him. In the affair of Roscius, where the proof depended upon circumstances, Cicero, who defended him, inquires what reason could be alleged for his committing so black a crime, as to kill his father. And after he has shewn there was no probable reason to be assigned for it, he adds, "Well, since you can offer no reason, although this might be sufficient for me, yet I will recede from my right; and upon the assurance I have of his innocence, I will grant you in this cause what I would not in another. I do not therefore insist upon your telling me why he killed his father, but ask how he did it?" This appearance of candour and ingenuity in such concessions removes the suspicion of art, and gives greater credit to what is denied. We have an example of a feigned or ironical concession, in Cicero's defence of Flaccus; where, interceding for him on the account of his former good services in the time of Cataline's conspiracy, he says in a way of irony, If such things are to be overlooked, "let us appease the ghosts of Lentulus and Cethegus; let us recall those who are in exile; and let us be punished for our too great affection and love for our country." By this artful insinuation the orator, after he has used all his arguments to persuade his hearers, does as it were set them at liberty, and leave them to their own election; it being the nature of man to adhere more steadfastly to what is not violently imposed, but referred to their own free and deliberative choice. And to these feigned concessions may be referred such ways of reasoning, by which the orator both justifies a charge brought against him upon the supposition of its being true, and also proves that the charge itself is false. Thus Cicero, in his defence of Milo, represents the taking off Clodius, with which Milo was accused, as a glorious action; after he has shewn that Milo's servants did it without the knowledge of their master.

Parabole or *similitude*, illustrates a thing by comparing it with some other, to which it bears a resemblance. Similitudes are indeed generally but weak

arguments, though often beautiful and fine ornaments. *Elocution.* And where the design of them is not so much to prove what is doubtful, as to set things in a clear and agreeable light, they come properly under the notion of figures. They are of two sorts; simple and compound. Those are called *simple*, in which one thing only is likened or compared to another, in this manner: *As swallows appear in summer, but in winter retreat; so false friends show themselves in prosperity, but all fly away when adversity approaches.* Compound similitudes are such, wherein one thing is likened or compared to several others; as thus: *What light is to the world, physic to the sick, water to the thirsty, and rest to the weary; that is knowledge to the mind.* The more exact the agreement is between the things thus compared, they give the greater beauty and grace to the figure.

Antithesis or *opposition*, by which things contrary or different are compared, to render them more evident. Thus Cicero says, "The Roman people hate private luxury, but love public grandeur." This is a very florid figure; and suited no less for amplification than proof. As in the following instance of Cicero, where, speaking of Pompey, he says, "He waged more wars than others had read; conquered more provinces than others had governed; and had been trained up from his youth to the art of war, not by the precepts of others, but by his own commands; not by miscarriages in the field, but by victories; not by campaigns, but triumphs." It is esteemed a beauty in this figure when any of the members are inverted, which some call *antimetathesis*. As where Cicero, opposing the conduct of Verres when governor of Sicily, to that of Marcellus who took Syracuse the capital city of that island, says, "Compare this peace with that war, the arrival of this governor with the victory of that general, his profligate troops with the invincible army of the other, the luxury of the former with the temperance of the latter; you will say, that Syracuse was founded by him who took it, and taken by him who held it when founded." To this figure may also be referred *oxymoron*, or *seeming contradiction*; that is, when the parts of a sentence disagree in sound, but are consistent in sense. As when Ovid says of Althea, *that she was impiously pious.* And so Cato used to say of Scipio Africanus, that "he was never less at leisure, than when he was at leisure; nor less alone, than when alone." By which he meant, as Cicero tells us, that "Scipio was wont to think of business in his retirement, and in his solitude to converse with himself." This is a strong and bold figure, which awakens the mind, and affords it an agreeable pleasure to find upon reflection, that what at first seemed contradictory, is not only consistent with good sense, but very beautiful.

II. *Those suited to move the passions.* Which are 13; namely, *epanorthosis*, *paralepsis*, *parrhesia*, *aparthnesis*, *exergasia*, *hypotyposis*, *aporia*, *pepsepsis*, *erotisi*, *ecphonesis*, *epiphonema*, *apostrophe*, and *prospecia*.

Epanorthosis, or *correction*, is a figure, by which the speaker either recalls or amends what he had last said. It is used different ways. For sometimes one or more words are recalled by him, and others subjoined in their room; at other times, without recalling what has been said, something else is substituted as more suitable. This is a very extensive figure, and

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made:

made use of in addressing to different passions. We have an instance of it in Terence's *Self-tormentor*, where the old man, whose extraordinary concern for the absence of his son gave occasion to the name of the play, thus bewails his condition to his neighbour, "I have an only son, Chremes. Alas! did I say that I have? I had indeed; but it is now uncertain whether I have or not." Here, to aggravate his misfortune, he recalls a pleasing word, and substitutes another more affecting in its place. And Cicero, in his defence of Milo, speaking to the judges concerning Clodius, says, "Are you only ignorant, what laws, if they may be called laws, and not rather torches and plagues of the state, he was about to impose and force upon us?" Again, in his defence of Plancius he says, "What greater blow could those judges, if they are to be called judges, and not parricides of their country, have given to the state, than when they banished him, who, when prætor, freed the republic from a neighbouring war, and when consul, from a civil one?" He is speaking there of Opimius. But in commending the moderation of Lucius Mummius, who did not enrich himself, but his country, by demolishing the wealthy city of Corinth, he thus recalls his whole expression, and by giving it a new turn heightens the compliment he designed him: "He chose rather (says he) to adorn Italy, than his own house; though by adorning Italy, his house seems to have received the greatest ornament." And sometimes the correction is made by substituting something contrary to what had been said before; as in the following passage of Cicero: "Cæsar, (meaning Augustus) though but a youth, by an incredible and surprising resolution and courage, when Antony was most enraged, and we dreaded his cruel and pernicious return from Brundisium, at a time when we neither asked, nor expected, nor desired it, (because it was thought impossible), raised a very powerful army of invincible veterans; to effect which, he threw away his whole estate: Tho' I have used an improper word; for he did not throw it away, but employed it for the safety of the government." At other times, as has been said, the correction is made by adding a more suitable word, without any repetition of the former. Thus Cicero, after he has inveighed against the crimes of Verres, breaks out into this pathetic exclamation; *O the clemency, or rather wonder ful and singular patience, of the Roman people!* He did not think the word *clemency* strong enough, and therefore adds *patience*, as better answering his design. The sudden and unexpected turn of this figure gives a surprize to the mind, and by that means renders it the more pathetic.

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Paralepsis, or omission, is another of these figures, when the speaker pretends to omit, or pass by, what at the same time he declares. It is used either in praise or dispraise. Thus Cicero, in his defence of Sextius, introduces his character in this manner, with a design to recommend him to the favour of the court: "I might say many things of his liberality, kindness to his domestics, his command in the army, and moderation during his office in the province: but the honour of the state presents itself to my view; and calling me to it, advises me to omit these lesser matters." But in his oration to the senate against Rullus the tribune, who had proposed a law to sell the public

lands, he makes use of this figure to represent the pernicious effects of such a law, particularly with respect to the lands in Italy. "I do not complain (says he) of the diminution of our revenues, and the woful effects of this loss and damage. I omit what may give every one occasion for a very grievous and just complaint, that we could not preserve the principal estate of the public, the finest possession of the Roman people, the fund of our provisions, the granary of our wants, a revenue entrusted with the state; but that we must give up those lands to Rullus, which, after the power of Sylla, and the largesses of the Gracchi, are yet left us. I do not say, this is now the only revenue of the state, which continues when others cease, is an ornament in peace, fails us not in war, supports the army, and does not fear an enemy. I pass over all these things, and reserve them for my discourse to the people, and only speak at present of the danger of our peace and liberties." His view here was to raise the indignation of the senate against Rullus, and excite them to oppose the law. There is a beautiful instance of this figure in St Paul's epistle to Philemon, where, after he has earnestly intreated him to receive again Onesimus his servant, who had run from him, and promised that if he had wronged him, or owed him any thing, he would repay it, he adds, *That I may not say, you owe even yourself to me.* Nothing could be a stronger motive to soften his displeasure against his servant, from a sense of gratitude to the apostle. Hermogenes has observed, that the design of this figure is to possess the minds of the audience with more than the words express, and that it is principally made use of on three occasions: either when things are small, but yet necessary to be mentioned; or well known, and need not be enlarged on; or ungrateful, and therefore should be introduced with caution, and not set in too strong a light.

The next figure abovementioned was *Parrhesia*, or reprehension: Not that whenever a person admonishes or reproves another, it is to be esteemed a figure; but when it is done with art and address, and in such circumstances as render it difficult not to displease. The The orator therefore sometimes prepares his hearers for this by commending them first, urging the necessity of it, representing his great concern for them as his motive, or joining himself with them. Thus Cicero charges the senate with the death of Servius Sulpicius, for sending him to Mark Antony under a very ill state of health. And his design in it was to bring them more readily into a motion he was about to make, that both a statue and a sepulchral monument might be erected to his memory at the public expence. "You (says he), it is a very severe expression, but I cannot help saying it; you, I say, have deprived Servius Sulpicius of his life. It was not from cruelty indeed, (for what is there with which this assembly is less chargeable?) but when his disemper pleaded his excuse more than his words, from the hopes you conceived, that there was nothing which his authority and wisdom might not be able to effect, you vehemently opposed his excuse, and obliged him, who always had the greatest regard for your commands, to recede from his resolution." Sometimes, indeed, the orator assumes an air of reproof, with a

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view only to pass a compliment with a better grace. As Cicero in his address to Cæsar, when he says, "I hear that excellent and wise saying from you with concern, That you have lived long enough, either for the purposes of nature, or glory: for nature perhaps, if you think so; and, if you please, for glory; but, what is principally to be regarded, not for your country." It adds both a beauty and force to this figure, when it is expressed in a way of comparison. As in the following instance of Cicero: "But since my discourse leads me to this, consider how you ought to be affected for the dignity and glory of your empire. Your ancestors often engaged in war to redress the injuries of their merchants or sailors: how ought you then to resent it, that so many thousand Roman citizens were murdered by one message, and at one time? Your forefathers destroyed Corinth, the principal city in Greece, for the haughty treatment of their ambassadors; and will you suffer that king to go unpunished who has put to death a Roman legate, of consular dignity, in the most ignominious as well as most cruel manner? See, lest, as it was their honour to leave you the glory of so great an empire, it should prove your disgrace not to be able to maintain and defend what you have received from them." By this figure an address is made to the more tender passions, modesty, shame, and emulation, the attendants of an ingenuous temper, which is soonest touched, and most affected, by a just reproof.

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Another of these pathetic figures is *Aparithmesis*, or *enumeration*, when that which might be expressed in general by a few words, is branched out into several particulars, to enlarge the ideas, and render it the more affecting. Cicero in pleading for the Manilian law, where his design is to conciliate the love and esteem of the people to Pompey, thus enlarges upon his character: "Now, what language can equal the virtue of Cneius Pompey? What can be said either worthy of him, or new to you, or which every one has not heard? For those are not the only virtues of a general which are commonly thought so; labour in affairs, courage in dangers, industry in acting, dispatch in performing, design in contriving; which are greater in him than in all other generals we have ever seen or heard of." And so likewise, when he endeavours to dispose of Pompey of the apprehension that Milo designed to assassinate him: "If (says he) you fear Milo; if you imagine that either formerly, or at present, any ill design has been formed by him against your life; if the soldiers raised through Italy, (as some of your officers give out), if these arms, if these cohorts in the Capitol, if the centries, if the watch, if the guards which defend your person and house, are armed to prevent any attempt of Milo, and all of them appointed, prepared, and stationed on his account; he must be thought a person of great power, and incredible resolution, above the reach and capacity of a single man, that the most consummate general, and the whole republic are in arms against him only. But who does not perceive, that all the disordered and sinking parts of the state are committed to you, to rectify and support them by these forces?" This might have been said in a few words, that such vast preparations could never be intended for so low a purpose. But the orator's view was to expose that

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groundless report, and shame it out of countenance. And soon after he endeavours to raise compassion for Milo under those prejudices, by the same figure: "See how various and changeable is the state of human life, how unsteady and voluble is fortune, what infidelity in friends, what disguises suited to the times, what flights, what fears, even of the nearest acquaintance, at the approach of dangers." Had no address to the passions been designed here, fewer of these reflections might have been sufficient. The use of this figure in amplification is very evident from the nature of it, which consists in unfolding of things, and by that means enlarging the conception of them.

Exergasia, or *exposition*, has an affinity with the former figure: but it differs from it in this, that it consists of several equivalent expressions, or nearly such, in order to represent the same thing in a stronger manner; whereas the other enlarges the idea by an enumeration of different particulars. So that this figure has a near relation to synonymia, of which we have treated before under *Verbal figures*. We have an instance of it in Cicero's defence of Sextius, where he says, "Those who at any time have incited the populace to sedition, or blinded the minds of the ignorant by corruption, or traduced brave and excellent men, and such as deserved well of the public, have with us always been esteemed vain, bold, bad, and pernicious citizens. But those who repressed the attempts and endeavours of such as, by their authority, integrity, constancy, resolution, and prudence, withstood their insolence, have been always accounted men of solidity, the chiefs, the leaders, and supporters of our dignity and government." Nothing more is intended by this passage, but to set the opposite characters of seditious persons and true patriots in the strongest light, with a view to recommend the one, and create a just hatred and detestation of the other. So elsewhere he represents the justice of self-defence in no less different terms: "If reason (says he) prescribes this to the learned, and necessity to barbarians, custom to nations, and nature itself to brutes, always to ward off all manner of violence, by all possible ways, from their body, from their head, from their life; you cannot judge this to be a criminal and wicked action, without judging at the same time that all persons who fall among robbers and assassins must either perish by their [weapons, or your sentence]."—He is addressing here to the judges in favour of Milo. The warmth and vehemence of the speaker often runs him into this figure, when he is affected with his subject, and thinks no words, no expressions, forcible enough to convey his sentiments; and therefore repeats one after another, as his fancy suggests them. This flow of expression, under the conduct of a good judgment, is often attended with advantage; as it warms the hearers, and impresses their minds, excites their passions, and helps them to see things in a stronger light.

Hypotyposis, or *imagery*, is a description of things painted in such strong and bright colours, as may help the imagination of the hearers to conceive of them rather as present to their view, than described in words. It is peculiarly suited for drawing characters; and often affords the finest ornaments in poetry and history, as well as oratory. Nor is it less moving,

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but suited to strike different passions, according to the nature of the subject, and artful management of the speaker. Cicero has thus drawn the picture of Catiline, consisting of an unaccountable mixture of contrary qualities. "He had (says he) the appearance of the greatest virtues: he made use of many ill men to carry on his designs, and pretended to be in the interest of the best men; he had a very engaging behaviour, and did not want industry nor application; he gave into the greatest looseness, but was a good soldier. Nor do I believe there was ever the like monster in the world, made of such jarring and repugnant qualities and inclinations. Who at one time was more acceptable to the best men, and who more intimate with the worst? Who was once a better patriot, and who a greater enemy to this state? Who more devoted to pleasures, who more patient in labours? Who more rapacious, and yet more profuse? He suited himself to the humours of all he conversed with: was serious with the reserved, and pleasant with the jocular; grave with the aged, and facetious with the young; bold with the daring, and extravagant with the profligate."—Such a character of a man, when accompanied with power and interest, must render him no less the object of fear, than detestation; which was the design of Cicero in this description. And elsewhere, in order to prevail with the senate to direct the execution of those conspirators with Catiline who were then in prison, he paints the most dismal scene of that horrid design in the strongest colours. "Methinks (says he) I see this city, the light of the world, and citadel of all nations, suddenly falling into one fire; I perceive heaps of miserable citizens unhuried in their ruined country; the countenance and fury of Cethegus raging in your slaughter, presents itself to my view." This figure is very serviceable in amplification, as we have formerly shewn in treating upon that subject. But no small judgment is required in the management of descriptions. Lesser circumstances should either be wholly omitted, or but slightly touched; and those which are more material drawn in their due proportion. Nature is as much the rule of the orator as of the painter, and what they both propose to imitate. And therefore, let a thought be ever so pleasing and beautiful in itself, it must not be introduced when foreign to the purpose, or out of its place; any more than a painter should attempt to alter nature, when he proposes to copy it. This figure requires likewise a vigorous and lively genius. For the images in description can rise no higher than the conception of the speaker, since the idea must first be formed in his own mind before he can convey it to others; and agreeably to the clearness with which he conceives it himself, he will be able to express it in words.

Aporia, or *doubt*, expresses the debate of the mind with itself upon a pressing difficulty. A person in such a state is apt to hesitate, or start several things successively, without coming to any fixed resolution. The uneasiness arising from such a disorder of thought is naturally very moving. Of this kind is that of Cicero for Cluentius, when he says, "I know not which way to turn myself. Shall I deny the scandal thrown upon him of bribing the judges? Can I say the people were not told of it? that it was not talked

of in the court? mentioned in the senate? Can I remove an opinion so deeply and long rooted in the minds of men? It is not in my power. You, judges, must support his innocence, and rescue him from this calamity." Orators sometimes choose to begin their discourse with this figure. A diffidence of mind at first is not unbecoming, but graceful. It carries in it an air of modesty, and tends very much to conciliate the affections of the hearers. Livy gives us a very elegant example of this, in a speech of Scipio Africanus to his soldiers, when, calling them together after a sedition, he thus bespeaks them: "I never thought I should have been at a loss, in what manner to address my army. Not that I have applied myself more to words, than things; but because I have been accustomed to the genius of soldiers, having been trained up in the camp almost from my childhood. But I am in doubt what or how to speak to you, not knowing what name to give you. Shall I call you *citizens*, who have revolted from your country? *Soldiers*, who have disowned the authority of your general, and broke your military oath? *Enemies*? I perceive the mien, the aspect, and habit of citizens; but discern the actions, words, designs, and dispositions of enemies."

Sometimes a passion has that effect, not so much to render a person doubtful what to say, as to stop him in the midst of a sentence, and prevent his expressing the whole of what he designed; and then it is called *Aposiopesis*, or *concealment*. It denotes different passions; as anger, which, by reason of its heat and vehemence, causes persons to break off abruptly in their discourse. So the old man in Terence, when he was jealous that his servant obstructed his designs, uses this imperfect, but threatening expression; *Whom, if I find.* And Neptune, when described by Virgil as very angry that the winds should presume to disturb the sea without his permission, after he has called them to him to know the reason of it, threatens them in this abrupt manner:

"Whom I—but first I'll lay the storm."

But Cicero, in writing to Atticus, applies it to express grief, where he says, "I know nothing of Pompey, and believe he must be taken, if he is not got on shipboard. O incredible swiftness! But of our friend.—Though I cannot accuse him without grief, for whom I am in so much concern and trouble." And in a letter to Cassius he uses it to express fear, when he says to him, "Brutus could scarce support himself at Mutina; if he is safe, we have carried the day. But if—heaven avert the omen! all must have recourse to you." His meaning is, "If Brutus should be defeated."

The next figure is *erotesis*, or *interrogation*. But every interrogation or question is not figurative. When we inquire about a thing that is doubtful, in order to be informed, this is no figure, but the natural form of such expressions. As if I ask a person, *Where he is going?* or *What he is doing?* But then it becomes figurative when the same thing may be expressed in a direct manner; but the putting it by way of question gives it a much greater life and spirit. As when Cicero says, "Catiline, how long will you abuse our patience? do not you perceive your designs are discovered?" He might indeed have said, *You abuse our patience a long while. You must be sensible your designs*

Elocution. are discovered. But it is easy to perceive how much this latter way of expression falls short of the force and vehemence of the former. And so when Medea says, *I could save; and do you ask, if I can destroy?* Had she said, *I could save, and I can destroy*, the sentence had been flat, and very unfit to express the rage and fury in which the poet there represents her. This figure is suited to express most passions and emotions of the mind, as anger, disdain, fear, desire, and others. It serves also to press and bear down an adversary. Cicero frequently makes this use of it. As in his defence of Plancius: "I will make you this offer (says he) choose any tribe you please, and shew, as you ought, by whom it was bribed; and if you cannot, as I believe you will not undertake it, I will prove how he gained it. Is this a fair contest? Will you engage on this foot? I cannot give you fairer play. Why are you silent? Why do you dissemble? Why do you hesitate? I insist upon it, urge you to it, press it, require, and even demand it of you." Such a way of pushing an antagonist shews the speaker has great confidence in his cause; otherwise he would never lay himself so open, if he was not assured the other party had nothing to reply. This figure likewise diversifies a discourse, and gives it a beautiful variety, by altering the form of expression; provided it be neither too frequent, nor continued too long at once. And besides the warmth and eager manner in which it is expressed, enlivens the hearers, and quickens their attention.

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Epiphonesis, or exclamation, is a vehement extension of the voice, occasioned by a commotion of mind, naturally venting itself by this figure, which is used by Cicero to express a variety of passions. It often denotes resentment or indignation. Thus, after his return from banishment, reflecting on those who had occasioned it, he breaks out into this moving exclamation: "O mournful day to the senate, and all good men, calamitous to the state, afflictive to me and my family, but glorious in the view of posterity!" His design was to excite an odium against the authors of his exile, when recalled in so honourable a manner. And again in his defence of Cælius: "O the great force of truth; which easily supports itself against the wit, craft, subtilty, and artful designs of men!" He had been just shewing the absurdity of the charge against Cælius, and now endeavours to expose his accusers to the indignation of the court. At other times it is used to express disdain or contempt. As when speaking of Pompey's house, which was bought by Mark Anthony, he says: "O consummate impudence! dare you go within that house! dare you enter that venerable threshold, and show your audacious countenance to the tutelar deities, which reside there?" Nor is it less suited to indicate grief, as when he says of Milo: "O that happy country, which shall receive this man! ungrateful this, if it banish him! miserable, if it lose him!" And sometimes it serves to express admiration; as when, in compliment to Cæsar, he says, "O admirable clemency! worthy of the greatest praise, the highest encomiums, and most lasting monuments!" It has its use also in ridicule and irony. As in his oration for Balbus, where he derides his accuser, by saying, "O excellent interpreter of the law! master of antiquity! corrector

and amender of our constitution!" The sacred writers sometimes use it by way of intreaty or wish. As the royal Psalmist: "O that I had the wings of a dove, that I might flee away, and be at rest!" And at other times in triumph and exultation, as in that of St Paul: "O death, where is thy sting! O grave, where is thy victory!" It is frequently joined with the preceding figure, *interrogation*; as appears in some of the instances here brought from Cicero. And it generally follows the representation of the thing which occasions it. Though sometimes it is made use of to introduce it, and then it serves to prepare the mind by exciting its attention. Thus Cicero, in his defence of Cælius, to render the character of Clodia more odious, at whose infatigation he was accused, insinuates that she had before poisoned her husband; and to heighten the barbarity of the fact, and make it appear the more shocking, he introduces the account of it, with this moving exclamation: "O heavens, why do you sometimes wink at the greatest crimes of mankind, or delay the punishment of them to futurity!"

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Epiphonema, or acclamation, has a great affinity with the former figure. And it is so called, when the speaker, at the conclusion of his argument, makes some lively and just remark upon what he has been saying, to give it the greater force, and render it the more affecting to his hearers. It is not so vehement and impetuous as exclamation, being usually expressive of the milder and more gentle passions. And the reflection ought not only to contain some plain and obvious truth, but likewise to arise naturally from the discourse which occasioned it, otherwise it loses its end. When Cicero has shewn, that recourse is never to be had to force and violence, but in cases of the utmost necessity, he concludes with the following remark: "Thus to think, is prudence; to act, fortitude; both to think and act, perfect and consummate virtue." And elsewhere, after he has described a singular instance of cruelty and breach of friendship: "Hence (says he) we may learn, that no duties are so sacred and solemn, which covetousness will not violate." This figure is frequently expressed in a way of admiration. As when Cicero has observed, that all men are desirous to live to an advanced age, but uneasy under it when attained, he makes this just reflection upon such a conduct: "So great is their inconstancy, folly, and perverseness!"

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The next figure in order is *apostrophe, or address*, when the speaker breaks off from the series of his discourse, and addresses himself to some particular person present or absent, living or dead; or to inanimate nature, as endowed with sense and reason. By this means he has an opportunity of saying many things with greater freedom than perhaps would be consistent with decency if immediately directed to the persons themselves. He can admonish, chide, or censure, without giving offence. Nor is there any passion, but may be very advantageously expressed by this figure. When an orator has been speaking of any particular person, on a sudden to turn upon him, and apply the discourse to that person himself, is very moving; it is like attacking an adversary by surprise, when he is off his guard, and where he least expects it. Thus Cicero: "I desire, senators, to be merciful, but not to appear negligent in so great dangers of the state; tho'

at present I cannot but condemn myself of remissness. There is a camp formed in Italy, at the entrance of Etruria, against the state; our enemies increase daily; but we see the commander of the camp, and general of the enemies, within our walls, in the very senate, contriving some intestine ruin to the state. If now, Catiline, I should order you to be seized and put to death, I have reason to fear, that all good men would rather think I had deferred it too long, than charge me with cruelty. But I am prevailed with for a certain reason not to do that yet, which ought to have been done long since." This sudden turn of the discourse to Catiline himself, and the address to him in that unexpected manner, must have touched him very sensibly. So in his defence of Milo, expressing his concern if he should not succeed in it, he says: "And how shall I answer it to you, my brother Quintus, the partner of my misfortunes, who art now absent." And elsewhere addressing to the soldiers of the Martian legion, who had been killed in an engagement with Mark Anthony, he thus bespeaks them: "O happy death, which due to nature, was paid to your country! I may esteem you truly born for your country, who likewise received your name from Mars; so that the same deity seems to have produced this city for the world, and you for this city." And in his oration for Balbus he thus calls upon dumb nature to witness to Pompey's virtues: "I invoke you, mute regions; you, most distant countries; you seas, havens, islands, and shores. For what coast, what land, what place is there, in which the marks of his courage, humanity, wisdom, and prudence, are not extant?" An appeal to heaven, or any part of inanimate nature, has something very sublime and solemn in it, which we often meet with in sacred writ. So the divine prophet: "Hear, O heavens! and give ear, O earth! for the Lord hath spoken." And in like manner, the prophet Jeremy: "Be astonished, O ye heavens, at this."

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Prosopopea, or the fiction of a person: by which, either an absent person is introduced speaking; or one who is dead, as if he was alive and present; or speech is attributed to some inanimate being. There is no figure, perhaps, which serves more or better purposes to an orator than this. For by this means he is enabled to call in all nature to his assistance, and can assign to every thing such parts as he thinks convenient. There is scarce any thing fit to be said, but may be introduced this way. When he thinks his own character is not of sufficient weight to affect his audience in the manner he desires, he substitutes a person of greater authority than himself to engage their attention. When he has severe things to say, and which may give offence as coming from himself; he avoids this, by putting them into the mouth of some other person from whom they will be better taken; or makes inanimate nature bring a charge, or express a resentment, to render it the more affecting. And by the same method he sometimes chooses to secure himself from a suspicion of flattery, in carrying a compliment too high. We meet with several very beautiful instances of this figure in Cicero; but an example of each sort may here suffice, beginning with that of an absent person, from his defence of Milo, whom he thus introduces as speaking to the citizens of Rome: "Should he, holding the bloody sword, cry out, At-

tend, I pray, hearken, O citizens, I have killed Publius Clodius; by this sword, and by this right hand, I have kept off his rage from your necks, which no laws, no courts of judicature, could restrain; it is by my means, that justice, equity, laws, liberty, shame, and modesty, remain in the city. Is it to be feared how the city would bear this action? Is there any one now, who would not approve and commend it." And in his oration for Balbus, he introduces Marius, who was then dead, to plead in his defence: "Can Balbus (says he) be condemned, without condemning Marius for a like fact? Let him be present a little to your thoughts, since he cannot be so in person; that you may view him in your minds, though you cannot with your eyes. Let him tell you, he was not unacquainted with leagues, void of examples, or ignorant of war." And again, in his first invective against Catiline, he represents his country as thus expostulating with himself, and upbraiding him for suffering such a criminal as Catiline to live. "Should my country (says he), which is much dearer to me than my life, should all Italy, all the state, thus address me, Mark Tully, what do you do? Do you suffer him, whom you have found to be an enemy, who you see is to be at the head of the war, whom you perceive your enemies wait for in their camp as their general, who has been the contriver of this wickedness, the chief of the conspiracy, the exciter of slaves and profligate citizens, to leave the city, which is rather to bring him in, than let him out? Will not you order him to be imprisoned, condemned, and executed? What prevents you? The custom of our ancestors? But private persons have often punished pernicious citizens in this state. The laws relating to the punishment of Roman citizens? But traitors never had the rights of citizens. Do you fear the censure of posterity? Truly you make a very handsome return to the people of Rome, who have advanced you from an obscure condition so early to the highest dignity; if you neglect their safety to avoid envy, or from the apprehension of any danger. And if you fear censure; which is most to be dreaded, that which may arise from justice and fortitude, or from cowardice and treachery? When Italy shall be wasted by a war, cities plundered, and houses burnt, do you think then to escape the severest censure." In the management of this figure, care should be taken, that what is said be always consistent with the character introduced, in which both the force and beauty of it consist.

In treating upon figures, we have hitherto considered them separately; but it may not be amiss to observe, that some expressions consist of a complication of them, and may come under the denomination of several figures, as well verbal as those of sentences, differently considered. Thus when Cicero says: "What, Tubero, did your drawn sword do in the Pharalian battle? at whose side was its point directed? what was the intention of your arms?" As he speaks to Tubero, it is an apostrophe; as the expressions have much the same import, and are designed to heighten and aggravate the fact, it is *exergasia*; and as they are put by question, it is *interrogation*. So likewise in his second Philippic, where he says, "What can I think? that I am contented? I see nothing in my life, interest, actions, or abilities, as moderate

derate as they are, which Anthony can despise. Did he think he could easily lessen me in the senate? But they, who have commended many famous citizens for their good government of the state, never thanked any but me for preferring it. Would he contend with me for eloquence? This would be a favour indeed. For what could be a larger and more copious subject, than for me to speak for myself against Anthony? His design was really this: he thought he could not convince his associates, that he was truly an enemy to his country, unless he was so first to me." There are three figures in this passage; *doubt, interrogation, and subjection*. And again, when he introduces Sicily thus addressing to Verres in a way of complaint: "Whatever gold, whatever silver, whatever ornaments in my cities, dwellings, temples, whatever right of any kind I possessed by the favour of the senate and people of Rome; you, Verres, have plundered and taken from me." Here is a *prolepsis*, joined with the verbal figure *anaphora*, as several members of the sentence begin with the same word. The like instances of complex figures frequently occur, and therefore we need not multiply examples of them here.

PARTICULAR ELOCUTION,

Or that part of Elocution which considers the several Properties and Ornaments of Language, as they are made use of to form different sorts of Style.

CHAP. IV. Of Style, and its different Characters.

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THE word *style*, properly signifies the instrument which the ancients used in writing. For as they commonly wrote upon thin boards covered over with wax, and sometimes upon the barks of trees, they made use of a long instrument like a bodkin, pointed at one end, with which they cut their letters; and broad at the other, to erase any thing they chose to alter. And this the Latins called *stilus*. But tho' this be the first sense of the word, yet afterwards it came to denote the manner of expression. In which sense we likewise use it, by the same kind of trope that we call any one's writing his *hand*. But as to the reasons which occasion a variety of style, they are principally these.

Since both speech and writing are only sensible expressions of our thoughts, by which we communicate them to others; as all men think more or less differently, so consequently they in some measure differ in their style. No two persons, who were to write upon one subject, would make use of all the same words. And were this possible, yet they would as certainly differ in their order and connection, as two painters, who used the same colours in painting the same picture, would necessarily vary their mixtures and disposition of them, in the several gradations of lights and shades. As every painter therefore has something peculiar in his manner, so has every writer in his style. It is from these internal characters, in a good measure, that critics undertake to discover the true authors of anonymous writings; and to shew that others are spurious, and not the genuine productions of those whose names they bear; as they judge of the age of such

writings from the words and manner of expression which have been in use at different times. And we may often observe in persons a fondness for some particular words or phrases; and a peculiarity in the turn or connection of their sentences, or in their transitions from one thing to another; by which their style may be known, even when they design to conceal it. For these things, thro' custom and habit, will sometimes drop from them, notwithstanding the greatest caution to prevent it.

There is likewise very often a considerable difference in the style of the same person, in several parts of his life. Young persons, whose invention is quick and lively, commonly run into a pompous and luxuriant style. Their fancy represents the images of things to their mind in a gay and spritely manner, clothed with a variety of circumstances; and while they endeavour to set off each of these in the brightest and most glittering colours, this renders their style verbose and florid, but weakens the force and strength of it. And therefore, as their imagination gradually cools, and comes under the conduct of a more mature judgment, they find it proper to cut off many superfluities; so that by omitting unnecessary words and circumstances, and by a closer connection of things placed in a stronger light, if their style becomes less swelling and pompous, it is, however, more correct and nervous. But as old age sinks the powers of the mind, chills the imagination, and weakens the judgment; the style, too, in proportion usually grows dry and languid. Critics have observed something of this difference in the writings even of Cicero himself. To be master of a good style, therefore, it seems necessary that a person should be endued with a vigorous mind and lively fancy, a strong memory, and a good judgment. It is by the imagination that the mind conceives the images of things. If the impressions of those images be clear and distinct, the style will be so too; since language is nothing but a copy of those images first conceived by the mind. But if the images are faint and imperfect, the style will accordingly be flat and languid. This is evident from the difference between such objects as are represented to our sight, and things of which we have only read or heard. For as the former generally make a deeper impression upon our minds, so we can describe them in a more strong and lively manner. And we commonly find, that according as persons are affected themselves when they speak, they are able to affect others with what they say. Now persons are more or less affected with things in proportion to the impressions which the images of those things make upon the mind. For the same reason also, if the imagination be dull, and indisposed to receive the ideas of things, the style will be stiff and heavy; or if the images are irregular and disordered, the style will likewise be perplexed and confused. When things lie straight (as we say) in the mind, we express them with ease, and in their just connection and dependence; but when they are warped and crooked, we deliver them with pain and difficulty, as well as disorder. A good fancy should likewise be accompanied with a happy memory. This helps us to retain the names of those things the ideas whereof are presented to the mind by the imagination, together

Elocution. together with proper and suitable phrases to express them in their several connections and relations to each other. When the images of things offer themselves to the mind, unless the names of them present themselves at the same time, we are at a loss to express them, or at least are in danger of doing it by wrong and improper terms. Besides, variety is necessary in discourse to render it agreeable; and therefore, without a large furniture of words and phrases, the style will necessarily become insipid and jejune, by the frequent return of the same terms and manner of expression. But to both these a solid judgment is highly requisite to form a just and accurate style. A fruitful imagination will furnish the mind with plenty of ideas, and a good memory will help to clothe them in proper language; but unless they are both under the conduct of reason, they are apt to hurry persons into many inconveniences. Such are generally great talkers, but far from good orators. Fresh images continually crowd in upon them, faster than the tongue can well express them. This runs them into long and tedious discourses, abounding with words, but empty of sense. Many impertinencies, if not improprieties, necessarily mix themselves with what they say; and they are frequently carried off from their point, by not having their fancies under a proper regulation. So that such discourses, though composed perhaps of pretty expressions, rhetorical flowers, and sprightly fallacies of wit, yet fall very much short of a strong and manly eloquence. But where reason presides and holds the reins, every thing is weighed before it is spoken. The properest words are made choice of, which best suit the ideas they are designed to convey; rather than the most gay and pompous. All things are not said, which offer themselves to the mind, and fancy dictates; but such only as are fit and proper, and the rest are dropped. Some things are but slightly mentioned, and others discoursed on more largely and fully, according to their different importance. And every thing is placed in that order, and clothed in such a dress, as may represent it to the greatest advantage. So that, in a word, the foundation of a good style is chiefly good sense. Where these qualities all meet in a considerable degree, such persons have the happiness to excel, either in speaking or writing. But this is not generally the case. Many persons of a vigorous and sprightly imagination, have but a weak judgment; and others much more judicious can think but slowly. And it is this, in a great measure, which makes the difference between speaking and writing well, as one or the other of these qualities is predominant. A person of a lively fancy, ready wit, and voluble tongue, will deliver himself off hand much better and more acceptably, than one who is capable, upon due premeditation, to discern farther into the subject, but cannot command his thoughts with the same ease and freedom. And this latter would have the same advantage of the other, were they both coolly to offer their sentiments in writing. Many things appear well in speaking, which will not bear a strict scrutiny. While the hearer's attention is obliged to keep pace with the speaker, he is not at leisure to observe every impropriety or incoherence, but many slips easily escape him, which in reading are presently discovered. Hence it is often found, that discourses, which were thought very fine when heard, appear to have much less beauty, as well as strength, when they come to be read. And therefore it is not without reason, that Cicero recommends to all those who are candidates for eloquence, and desirous to become masters of a good style, to write much. This affords them an opportunity to digest their thoughts, weigh their words and expressions, and give every thing its proper force and evidence; as likewise, by reviewing a discourse when composed, to correct its errors, or supply its defects; till by practice they gain a readiness both to think justly, and to speak with propriety and eloquence. But it is time to proceed to some other causes of the diversity of style.

Different countries have not only a different language, but likewise a peculiarity of style suited to their temper and genius. The eastern nations had a lofty and majestic way of speaking. Their words are full and sonorous, their expressions strong and forcible, and warmed with the most lively and moving figures. This is very evident from the Jewish writings in the Old Testament, in which we find a most agreeable mixture of simplicity and dignity. On the contrary, the style of the more northern languages generally partakes of the chiliness of their climate. "There is," says Mr Addison*, "a certain coldness and indifference in the phrases of our European languages, when they are compared with the oriental forms of speech. And it happens very luckily, that the Hebrew idioms run into the English tongue with a peculiar grace and beauty. Our language has received innumerable elegancies and improvements from that infusion of Hebrewisms, which are derived to it out of the poetical passages in holy writ. They give a force and energy to our expressions, warm and animate our language, and convey our thoughts in more ardent and intense phrases than any that are to be met with in our own tongue. There is something so pathetic in this kind of diction, that it often sets the mind in a flame, and makes our hearts burn within us."

Again, people of different nations vary in their customs and manners, which occasions a diversity in their style. This was very remarkable in the Attics, Asiatics, and Rhodians, and is often taken notice of by ancient writers. The Athenians, while they continued a free state, were an active, industrious, and frugal people; very polite indeed, and cultivated arts and sciences beyond any other nation; but as they had powerful enemies, and were exceeding jealous of their liberties, this preserved them from wantonness and luxury. And their way of speaking was agreeable to their conduct; accurate and close, but very full and expressive. The Asiatics, on the other hand, were more gay, and loose in their manners, devoted to luxury and pleasure; and accordingly they affected a florid and swelling style, filled with redundancies and superfluities of expression. Indeed, some of the ancients have attributed this looseness of style to their way of pursuing eloquence at first. For as they were put upon it by conversing with the Greek colonies who settled among them, they suppose, that in imitating them, before they were masters of the language, they were often obliged to make use of circumlocutions,

Elocution.

tions, which afterwards became habitual, and very much weakened the force of their expressions, as it naturally would do. But one would think, if they were put to this necessity at first, when they found its ill effect, they might easily have amended it afterwards, as they grew better acquainted with the Greek language, had they been inclined so to do. The Rhodian style was a medium between the other two; not so concise and expressive as the Attic, nor yet so loose and redundant as the Asiatic. Quintilian says, it had a mixture of its author, and the humour of the people; and, like plants set in a foreign soil, degenerated from the Attic purity, but not so wholly as to lose it. They first received it from Æschines, who being worsted in his famous contest with Demosthenes, retired thither, and taught rhetoric, which put them upon the study of eloquence.

The style of the same country likewise very much alters in different ages. Cicero tells us, that the first Latin historians aimed at nothing more than barely to make themselves intelligible, and that with as much brevity as they could. Those who succeeded them advanced a step further; and gave somewhat a better turn and cadency to their sentences, though still without any dress or ornament. But afterwards, when the Greek language became fashionable at Rome, by copying after their writers, such as Herodotus, Thucydides, Xenophon, and others, they endeavoured to introduce all their beauties into their own tongue, which in Cicero's time was brought to its highest perfection. But it did not long continue in that state. A degeneracy of manners soon altered their taste, and corrupted their language, which Quintilian very much complains of in his time. The case was the same with respect to the Greek tongue; though that had the good fortune to continue its purity much longer than the Latin. Nor can any language be exempt from the common fate of all human productions; which have their beginning, perfection, and decay. Besides, there is a sort of fashion in language, as well as other things, and the generality of people are always fond of running into the mode. Perhaps some one, or a few persons, fall into a manner which happens to please. This gives them a reputation; and others immediately copy after them, till it generally prevail. Cicero tells us, that the most ancient Greek orators, whose writings were extant in his time, such as Pericles, Alcibiades, and others, were subtle, acute, concise, and abounded in sense rather than words. But another set that followed them, of which were Critias, Theramenes, and Lyfias, retained the good sense of the former, and at the same time took more care of their style; not leaving it so bare as the former had done, but furnishing it with a better dress. After these came Isocrates, who added all the flowers and beauties of eloquence. And as he had abundance of followers, they applied these ornaments and decorations according to their different genius; some for pomp and splendour; and others to invigorate their style, and give it the greater force and energy. And in this latter way Demosthenes principally excelled. Now as each of these manners had its peculiar beauties, and generally prevailed in different ages; Cicero thinks this could not have happened otherwise than

from imitation. And he attributes it to the same cause, that afterwards they sunk into a softer and smoother manner, not less exact and florid, but more cold and lifeless. If we take a view of our own tongue, Chaucer seems to have been the first who made any considerable attempts to cultivate it. And whoever looks into him, will perceive the difference to be so great from what it is at present, that it scarce appears to be the same language. The gradual improvements it has since received, are very evident in the writers almost of every succeeding age since that time; and how much farther it may still be carried, time only can discover. See LANGUAGE.

Another cause of the variety of style arises from the different nature and properties of language. A difference in the letters, the make of the words, and the order of them, do all affect the style. So Quintilian observes, that the Latin tongue cannot equal the Greek in pronunciation, because it is harsher. The Latins want two of the softest Greek letters, *v* and *z*; and use others of a very hard sound, which the Greeks have not, as *f* and *g*. Again, many Latin words end in *m*; a letter of a broad and hollow sound, which never terminates any Greek word; but *v* does frequently, whose sound is much softer and sweeter. Besides, in the combination of syllables, the letters *b* and *d* are often so situated, as to require too strong and unequal a force to be laid upon them, as in the words *obversus* and *adjuugo*. Another advantage of the Greek tongue arises from the variety and different cast of the accents: for the Greeks often accent the last syllable, which both enlivens the pronunciation, and renders it more musical; whereas the Latins never do this. But the greatest advantage of the Greeks lies in their plenty and variety of words; for which reason they have less occasion for tropes or circumlocutions, which, when used from necessity, have generally less force, and weaken the style. But under these disadvantages, Quintilian seems to give his countrymen the best advice the case will admit of: That what they cannot do in words, they should make up in sense. If their expressions are not so soft and tender, they should exceed in strength; if they are less subtle, they should be more sublime; and if they have fewer proper words, they should excel in the beauty as well as number of their figures. If this account of Quintilian be just, that the Greek tongue does surpass the Latin in all these instances, it is certain that both of them have much greater advantages over some modern languages. The varying all their declinable words, both nouns and verbs, by terminations, and not by signs, contributes very much to the smoothness and harmony of their periods. Whereas in the modern languages, those small particles and pronouns, which distinguish the cases of nouns, and the tenses and persons of verbs, hinder the run of a period, and render the sound much more rough and uneven. Besides, the ancient languages seem to have a better and more equal mixture of vowels and consonants, which makes their pronunciation more easy and musical.

But the chief distinction of style arises from the different subjects, or matter of discourse. The same way of speaking no more suits all subjects, than the same garment would all persons. A prince and a peasant

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ought not to have the same dress; and another different from both becomes those of a middle station in life. The style therefore should always be adapted to the nature of the subject, which rhetoricians have reduced to three ranks or degrees; the *low* or *plain* style, the *middle* or *temperate*, and the *lofty* or *sublime*: Which are likewise called *characters*, because they denote the quality of the subject upon which they treat. This division of style into three characters, was taken notice of very early by ancient writers. Some have observed it even in Homer, who seems to assign the *sublime* or magnificent to Ulysses, when he represents him so copious and vehement an orator; that his words came from him like a winter snow. On the contrary, he describes Menelaus as a *polite* speaker, but *concise* and *moderate*. And when he mentions Nestor, he represents his manner as between these two, not so high and lofty as the one, nor yet so low and dressed as the other; but smooth, even, and pleasant, or, as he expresses it, *more sweet than honey*. Quintilian observes, that although accuracy and politeness were general characters of the Attic writers; yet among their orators, Lyfias excelled in the *low* and *familiar* way; Isocrates for his *elegancy*, *smoothness*, and the *fine turn* of his periods; and Demosthenes for his *force* and *rapidity*, by which he carried all before him. And Gellius tells us, that the like difference was found in the three philosophers who were sent from the Athenians to Rome (before the Romans had any relish for the polite arts) to solicit the remittance of a fine laid upon them for an injury done to a neighbouring state. Carneades, one of those ambassadors, was *vehement* and *rapid* in his harangues; Critolaus, *neat* and *smooth*; and Diogenes, *modest* and *sober*. The eloquence of these orators, and the agreeable variety of their different manner, so captivated the Roman youth, and inflamed them with a love of the Grecian arts, that old Cato, who did all he could to check it by hurrying away the ambassadors, could not prevent their vigorous pursuit of them, till the study became in a manner universal. And the old gentleman afterwards learned the Greek language himself, when it became more fashionable. Which a noble writer of ours * represents as a punishment upon him for his former crime. It seldom happens that the same person excels in each of these characters. They seem to require a different genius, and most people are naturally led to one of them more than another; though all of them are requisite for an orator upon different occasions, as we shall hereafter.

CHAP. V. Of the Low Style.

THIS we shall consider under two heads, *thoughts* and *language*; in each of which these several characters are distinguished from one another.

I. And with respect to the former, as the subjects proper for this style are either common things, or such as should be treated in a plain and familiar way; so plain thoughts are most suitable to it, and distinguish it from the other characters.

Now, by plain thoughts, are meant such as are simple and obvious, and seem to rise naturally from the subject, when duly considered; so that any one, upon first hearing them, would be apt to imagine they

must have occurred to himself. Not that this is really the case, but because the more natural a thing is, the more easy it seems to be; though in reality it is often otherwise; and the perfection of art lies in its nearest resemblance to nature. And therefore, in order to speak plainly and clearly upon any subject, it must first be duly considered, well understood, and thoroughly digested in the mind; which, though it require labour and study, yet the more a person is master of what he says, the less that labour will appear in his discourse. This natural plainness and simplicity, without any disguise or affectation, very much contributes to give credit to what is said. Nor is any thing more apt to impose on us, than the appearance of this, when artfully assumed. Cicero's account of the fight between Milo and Clodius, in which Clodius was killed, is a remarkable instance of this. "When Clodius knew (says he) that Milo was obliged to go to Lanuvium upon a solemn and necessary occasion, he immediately hastened from Rome, the day before, to assassinate him before Clodius's own house, as appeared afterwards by the event. And this he did at a time, when his turbulent mob in the city wanted his assistance; whom he would not have left, but for the advantage of that place and season to execute his wicked design. But the next day Milo was in the senate, where he continued till they broke up; then went home; changed his dress; staid there some time till his wife was ready; and afterwards set forward so late, that if Clodius had designed to return to Rome that day, he might have been here by that time. Clodius, prepared for his design, met him on horseback, having no chariot, no equipage, no Greek attendants as usual; and without his wife, which was scarce ever known: whereas Milo was in a chariot with his wife, wrapt up in a cloak, and attended by a large retinue of maid servants, pages, and other persons unfit for an engagement. He met with Clodius before his house, about five o'clock in the evening; and was presently assaulted from an higher ground by many armed men, who killed the coachman. Upon which, Milo, throwing off his cloak, leaped out of the chariot, and bravely defended himself: and those who were with Clodius, having their swords drawn, some made up to the chariot to attack Milo; and others, who now thought he had been killed, began to fall upon his servants who were behind. And of these, such as had courage, and were faithful to their master, some were killed; and others, when they saw the skirmish in the chariot, and could do their master no service (for they heard Clodius himself say that Milo was killed, and really thought it was so), did that, not by their master's order, not with his knowledge, nor when he was present, which every one would have his own servants to do in the like circumstances. I do not say this to fix any crime upon them, but only to relate what happened." His meaning is, they killed Clodius; which he avoids mentioning, to render what he says less offensive. Can any thing be told in a more plain and simple manner than this? Here is nothing said, but what in itself seems highly probable, and what one would imagine the fact might easily suggest to any ordinary spectator. But in this, both the art and skill of it consist. For in the whole account, as, on the one hand, Milo

* Lord Bacon.

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is so described as to render it highly improbable he could have any design at that time against Clodius; so on the other, no one circumstance is omitted which might seem proper to persuade the hearers that Clodius was the aggressor in that engagement. And yet, if we may believe Asconius, the quarrel was begun by some of Milo's retinue, and Clodius was afterwards killed by his express order. But as things are sometimes best illustrated by their opposites, we shall here produce a contrary instance of a very affected and unnatural way of relating a fact. Val. Maximus tells us of a learned man at Athens, who, by a blow which he received by a stone upon his head, entirely forgot all his learning, though he continued to remember every thing else. And therefore, as he says, since this misfortune deprived him of the greatest enjoyment of his life, it had been happier for him never to have been learned, than afterwards to lose that pleasure. This is the plain sense of the story. But now let us hear him relate it. "A man (says he) of great learning at Athens, having received a blow upon his head by a stone, retained the memory of all other things very perfectly, and only forgot his learning, to which he had chiefly devoted himself. The direful and malignant wound invading his mind, and as it were designedly surveying the knowledge deposited there, cruelly seized on that part of it in particular from which he received the greatest pleasure, and buried the singular learning of the man with an invidious funeral. Who since he was not permitted to enjoy his studies, had better never have obtained access to them, than afterwards to have been deprived of the delight they afforded him." What an unnatural way is this of relating such an accident, to talk of a wound invading the mind, and surveying the knowledge deposited there, and cruelly seizing a particular part of it, and burying it with an invidious funeral? There is nothing in the story could lead him to this, but an over-fondness to refine upon it in a very affected manner. But there are two properties of plain thoughts, one of which ought constantly to attend them in common with all thoughts, and the other is often necessary to animate and enliven this character.

The former of these is justness and propriety, which is what reason dictates in all cases. What Cicero says of the death of Crassus the orator, seems very just, as well as natural. "It was (says he) an affliction to his friends, a loss to his country, and a concern to all good men; but such public calamities followed upon it, that heaven seemed rather to have favoured him with death, than to have deprived him of life." This thought seems very just, and agreeable to the sentiments of a good man, as Crassus was, to choose death rather than to outlive the happiness of his country, to which he himself had so much contributed. Quintilian has a reflection upon a like occasion, which is not so just and becoming. It is upon the death of his only son, a youth of very uncommon parts, as he represents him; and for whose use he had designed his *Institutions of Oratory*; but he died before they were finished. The passage is this: "I have lost him of whom I had formed the greatest hopes, and in whom I had deposited the greatest comfort of my old age. What can I do now? or of what farther use can I think myself to be, thus disappointed by heaven? What good

parent will pardon me, if I can any longer study? and not condemn such resolution, if, thus surviving all my family, I can make any other use of my voice, than to accuse the gods, and declare that providence does not govern the world?" Allowance may be made for the sallies of passion, even in wise men, upon some shocking occasions; but when it proceeds to such a degree as to become impious, it is very indecent, as well as unjust. And all indecency is unnatural, as it is disagreeable to reason, which always directs to a decorum. That seems to be a very natural as well as just thought of Pliny the Younger, when he says, "The death of those persons always appear to me too hasty and unseasonable, who are preparing some lasting work. For persons wholly devoted to pleasures, live, as it were, from day to day, and daily finish the end for which they live; but those who have a view to posterity, and preserve their memory by their labours, always die untimely, because they leave something unfinished. We shall mention but one more instance; and that in a comparative view, to make it the more evident. The two sons of Junius Brutus, the first Roman consul, having been convicted of treason in associating with Tarquin's party, were ordered, among others, to be put to death; and their father not only pronounced the sentence, but presided at the execution. This fact is mentioned by several of the Roman historians; and, as it carries in it not only the appearance of rigorous justice, but likewise of cruelty in Brutus, to have been present at the execution of his sons, they endeavour to vindicate him different ways. What Florus says, seems rather an affectation of wit, than a just defence of the fact. "He beheaded them (says he), that, being a public parent, he might appear to have adopted the whole body of the people." Nor does Val. Maximus come up to the case, who says, "He put off the father to act the consul; and chose rather to lose his sons, than be wanting to public justice." This might be a reason for condemning them; and would have been equally true, had he not been present at their execution. But Livy, whose thoughts are generally very just and natural, assigns the best reason which perhaps can be given for his vindication, when he says, "Fortune made him the executioner of the sentence, who ought not to have been a spectator." By saying *fortune made him so*, he represents it not as a matter of choice, like the other historians, but of necessity, from the nature of his office, which then obliged him to see the execution of that sentence he had himself before pronounced; as is the custom at present, in some popular governments.

The other property, which should often accompany plain and simple thoughts, is, that they be gay and sprightly. This, as has been said, is necessary to animate and enliven such discourses as require the low style. The fewer ornaments it admits of, the greater spirit and vivacity is requisite to prevent its being dry and jejune. A thought may be very brisk and lively, and at the same time appear very natural, as the effect of a ready and flowing wit. Such thoughts, attended with agreeable turns, are very suitable to this style; but care should be taken, lest, while fancy is too much indulged, the justness of them be overlooked. We shall give one instance, in which this seems to have been the case, from a celebrated English work, where

the ingenious writer endeavours to shew the disadvantages of persons not attending to their natural genius, but affecting to imitate others in those things for which they were not formed. "The great misfortune (says he) of this affectation is, that men not only lose a good quality, but also contract a bad one; they not only are unfit for what they are designed, but they assign themselves to what they are unfit for; and instead of making a very good figure one way, make a very ridiculous one another. Could the world be reformed to the obedience of that famed dictate, *follow nature*, which the oracle of Delphos pronounced to Cicero when he consulted what course of studies he should pursue, we should see almost every man as eminent in his proper sphere as Tully was in his. For my part, I could never consider this preposterous repugnancy to nature any otherwise, than not only as the greatest folly, but also one of the most heinous crimes; since it is a direct opposition to the disposition of Providence, and (as Tully expresses it) like the sin of the giants, an actual rebellion against heaven." The advantages that arise from persons attending to their own genius, and pursuing its dictates, are here represented in a very lively and agreeable manner. But there is one thing asserted, which we fear will not hold; which is, that, *Could the world be reformed to that dictate*, "Follow nature," *we should see almost every man as eminent in his proper sphere, as Tully was in his*. For though doublets persons would generally succeed best, if they kept to this rule; yet different degrees of ability are often found, where the bias and inclination is the same, and that accompanied with equal labour and diligence. If this was not so, how happened it that no one came up to Tully in the art of oratory; especially in his own age, when there were the greatest opportunities for that study, and the highest encouragements were given to it, as it paved the way to riches, honours, and all the grand offices of the state? It cannot well be questioned, but that there were other gentlemen, who had all the same advantages, accompanied with as strong a passion for this art, as Tully had, who yet fell much short of him in point of success. And experience shews, that the case has been the same in all other pursuits.

102 III. But it is time to proceed to the other head, the language proper for this style. And here it may be observed in general, that the dress ought to be agreeable to the thoughts, plain, simple, and unaffected.

But the first thing that comes under consideration is elegance, or a proper choice of words and expressions; which ought always to suit the idea they are designed to convey. And therefore when an ancient writer, speaking of cruelty, calls it *nevus crudelitatis*, the blemish of cruelty; and another, applying the same word to ingratitude, says *nevus ingrattudinis*, the blemish of ingratitude; that term does not sufficiently convey to us the odious nature of either of those vices, as indeed it was not their design it should. But otherwise, where the speaker has not some particular view in doing it, to link too low is as much a fault, as to rise too high. So to call ancient Rome *the mistress of Italy*, would as much lessen the just notion of the extent of her power, as the Roman writers aggrandise it when they style her *mistress of the world*. But pu-

riety, both in the choice of words and expressions, is elocution, never more necessary than it is here. This may be called *neatness in language*. And to be plain and neat at the same time, is not only very consistent but the former can no other way recommend itself, than as joined with the latter. Besides, the fewer advantages any thing has to set it off, the more carefully they ought to be observed. Periphrasis is always to be regarded; and serves very much to keep up the attention, where other ornaments are wanting. Epithets should be sparingly used, since they enlarge the images of things, and contribute very much to heighten the style. Indeed they are sometimes necessary to set a thing in its just light; and then they should not be dropped. Thus, in speaking of Xerxes, it would be too low and flat to say, *He defended with his army into Greece*. Here is no intimation given of their vast and unparalleled numbers, which ought to be done. Herodotus says, his whole army, of sea and land forces, amounted to 2,317,000 and upwards. Therefore, unless the number be mentioned, the least that can be said is, that *he defended with a vast army*.

The next thing to be regarded is composition, which here does not require the greatest accuracy and exactness. A seeming negligence is sometimes a beauty in this style, as it appears more natural. Short sentences, or those of a moderate length, are likewise upon the whole best suited to this character. Long and accurate periods, finely wrought up with a gradual rise, harmonious numbers, a due proportion of the several parts, and a just cadency, are therefore improper, as they are plainly the effect of art. But yet some proportion should be observed in the members, that neither the ears be too much defrauded, nor the sense obscured. Of this kind is that expression of a Greek orator, blamed by Demetrius: *Ceres came readily to our assistance, but Arisides not*. The latter member of this sentence is too short; and by dropping so suddenly, both disappoints the ears, and is somewhat obscure. It would have been plainer, and more agreeable thus, *but Arisides did not come*. As to order, the plainest and clearest disposition, both of the words and members of sentences, and what is most agreeable to the natural construction, best suits this character. For one of its principal beauties is perspicuity. And a proper connection likewise of sentences, with a regular order in the dependence of things one upon another, very much contribute to this end. With regard to the collision of syllables in different words, for preventing either an hollowness or asperity of sound, greater liberty may be taken in this style than in the other characters. Here it may be allowed to say, *Virtue is amiable to all, though all do not pursue it*. But in an higher character, perhaps, in order to prevent the hollow sound of the words *though all*, a person would chuse to vary the expression a little, and say, *though few pursue it*. So, *Xerxes' expedition*, may be tolerable here; but in the florid style, *the expedition of Xerxes* would sound much better.

The last thing thing to be considered, with respect to the language, is dignity, or the use of tropes and figures. And as to tropes, they ought to be used cautiously; unless such as are very common, and by time have either come into the place of proper words, or at least

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least equally plain and clear. So in the instance mentioned above, Diodorus Siculus, speaking of the forces of Xerxes, calls them an *innumerable company*. Where, by a *synecdoche*, he has chose to make use of an uncertain number for a certain, as less liable perhaps to exception. Other examples might be given if necessary. And with regard to figures, as most of those which consist in words, and are therefore called *verbal figures*, serve chiefly to enliven an expression, and give an agreeable turn, they are often not improper for this character. Nor are figures of sentences wholly to be excluded, especially such as are chiefly used in reasoning or demonstration. But those which are more peculiarly adapted to touch the passions, or paint things in the strongest colours, are the more proper ornaments of the higher styles, as will be shewn hereafter.

Upon the whole, therefore, pure nature, without any colouring, or appearance of art, is the distinguishing mark of the low style. The design of it is to make things plain and intelligible, and set them in an easy light. And therefore the proper subjects of it are epistles, dialogues, philosophical dissertations, or any other discourses, that ought to be treated in a plain and familiar manner, without much ornament, or address to the passions. A freedom and ease both of thought and expression, attended with an agreeable humour and pleasantry, are its peculiar beauties that engage us. As we see persons of fashion and good breeding, though in the plainest habit, have yet something in their air and manner of behaviour that is very taking and amiable. Somewhat of the like nature attends this style. It has its difficulties, which are not so easily discerned, but from experience. For it requires no small skill, to treat a common subject in such a manner as to make it entertaining. The fewer ornaments it admits of, the greater art is necessary to attain this end. Lofty subjects often engage and captivate the mind by the sublimity of the ideas. And the florid style calls in all the assistance of language and eloquence. But the plain style is in a great measure stripped of those advantages; and has little more to recommend it, than its own native beauty and simplicity.

CHAP. VI. Of the Middle Style.

103 THIS we shall treat in the same manner as we did the former, by considering first the *matter*, and then the *language* proper for it.

104 I. And as the subjects proper for this style are things of weight and importance, which require both a gravity and accuracy of expression; so fine thoughts are its distinguishing-mark, as plain thoughts are of the low character, and lofty thoughts of the sublime. Now a fine thought may deserve that character from some or other of the following properties.

And the first property we shall mention is gravity and dignity. Thus Cicero in a speech to Cæsar says, "It has been often told me, that you have frequently said, you have lived long enough for yourself. I believe it, if you either lived, or was born for yourself only." Nothing could either be more fit and proper, than this was, when it was spoken; or at the same time a finer compliment upon Cæsar. For the civil

war was now over, and the whole power of the Roman government in the hands of Cæsar; so that he might venture to say, he had lived long enough for himself, there being no higher pitch of glory to which his ambition could aspire. But then there were many things in the state that wanted redressing, after those times of disorder and confusion, which he had not yet been able to effect, and of which Cicero here takes an opportunity to remind him. We shall produce another example from Curtius. Philotas, one of Alexander's captains, having formed a conspiracy against him, was convicted of it, and put to death. Amintas, who was suspected of the same crime, by reason of his great intimacy with Philotas, when he comes to make his defence, among other things speaks thus: "I am so far from denying my intimacy with Philotas, that I own I courted his friendship. Do you wonder that he shewed a regard to the son of Parmenio, whom you would have to be next to yourself, giving him the preference to all your other friends? You, Sir, if I may be allowed to speak the truth, have brought me into this danger. For to whom else is it owing, that those who endeavoured to please you, addressed themselves to Philotas? By his recommendation we have been raised to this share of your friendship. Such was his interest with you, that we courted his favour, and feared his displeasure. Did we not all in a manner engage ourselves by oath, to have the same friends, and the same enemies, which you had? Should we have refused to take this, which you as it were propoed to us? Therefore, if this be a crime, you have few innocent persons about you; nay, indeed none. For all desired to be the friends of Philotas; though all could not be so, who desired it. Therefore, if you make no difference between his friends and accomplices, neither ought you to make any between those who desired to be his friends, and those who really were so." Could any thing be finer spoken, more proper, and becoming the character of a soldier, than this defence; especially to a prince of so great and generous a spirit as Alexander? There is something which appears like this in Tacitus with relation to the emperor Tiberius, but falls vastly short of it in the justness and dignity of the sentiment. Sejanus, his great favourite, and partner in his crimes, falling under his displeasure, was, like Philotas, put to death for a conspiracy. Now a Roman knight, who apprehended himself in danger on account of his friendship with Sejanus, thus apologizes for himself to the emperor, in the manner of Amintas: "It is not for us to examine the merit of a person whom you raise above others, nor your reasons for doing it. The gods have given you the sovereign power of all things, to us the glory of obeying. Let conspiracies formed against the state, or the life of the emperor, be punished; but as to friendships and private regards, the same reason that justifies you, Cæsar, renders us innocent." The turn of the expressions is not much different from that in the case of Amintas; but the beauty of the thought is spoiled, by the flattery of complimenting Tiberius upon an excess of power, which he employed to the destruction of many excellent men. There is not that impropriety in the defence of Amintas, which is equally brave and just.

Another property of a fine thought is *beauty* and

Elocution. *eloquence.* It is a fine compliment which Pliny pays to the emperor Trajan, when he says: "It has happened to you alone, that you was father of your country, before you was made so." Some of the Roman emperors had been complimented with the title of *father of their country*, who little deserved it. But Trajan had a long time refused it, though he was really so, both by his good government, and in the esteem of his subjects, before he thought fit to accept of it. And Pliny, among other instances of the generosity of that prince, which he mentions in the same discourse, speaking of the liberty that he gave the Romans to purchase estates which had belonged to the emperors, and the peaceable possession they had of them, does it by a turn of thought no less beautiful than the former. "Such (says he) is the prince's bounty, such the security of the times, that he thinks us worthy to enjoy what has been possessed by emperors; and we are not afraid to be thought so." There is a spiriteliness in this image, which gives it a beauty; as there is likewise in the following passage of the same discourse, where he says to Trajan, "Your life is displeasing to you, if it be not joined with the public safety; and you suffer us to wish you nothing but what is for the good of those who wish it." And of the same kind is that of Cicero to Cæsar, when he says: "You, Cæsar, are wont to forget nothing but injuries." It is a very handsome, as well as just reflection, made by Tacitus upon Galba's government, that, "He seemed too great for a private man, while he was but a private man; and all would have thought him worthy of the empire, had he never been emperor." The beauty of a thought may give us delight, though the subject be sorrowful; and the images of things in themselves unpleasant, may be so represented as to become agreeable. Sissigambis, the mother of Darius, after the death of her son, had been treated by Alexander with the greatest regard and tenderness, in whose power she then was. So soon as she heard therefore that he was dead, she grew weary of life, and could not bear to outlive him. Upon which Q. Curtius makes this fine reflection: "Though she had courage to survive Darius, yet she was ashamed to outlive Alexander."

The next property of a fine thought, which we shall mention, is *delicacy*. As, in the objects of our senses, those things are said to be delicate which affect us gradually, in a soft and agreeable manner; so a delicate thought is that which is not wholly discovered at once, but by degrees opening and unfolding itself to the mind, discloses more than was at first perceived. Quintilian seems to refer to this, when he says, "Those things are grateful to the hearers, which when they apprehend, they are delighted with their own sagacity; and please themselves, as though they had not heard, but discovered them." Such thoughts are not unlike the sketches of some pictures, which let us into the design of the artist, and help us to discern more than the lines themselves express. Of this kind is that of Sallust: "In the greatest fortunes, there is the least liberty." This is not often so in fact, but ought to be; both to guard against an abuse of power, and to prevent the effects of a bad example to inferiors. Pliny, speaking of the emperor Trajan's

entry into Rome, says: "Some declared, upon seeing you, they had lived long enough; others, that now they were more desirous to live." The compliment is fine either way, since both must esteem the sight of him the greatest happiness in life; and in that consistency lies the delicacy of the thought. It was a fine character given of Grotius, when very young, on the account of his surprising genius and uncommon proficiency in learning, that *he was born a man*: As if nature, at his coming into the world, had at once furnished him with those endowments which others gradually acquire by study and application.

The last property of a fine thought, which we shall take notice of, is *novelty*. Mankind is naturally pleased with new things; and when at the same time they are set in an agreeable light, this very much heightens the pleasure. Indeed there are few subjects, but what have been so often considered, that it is not to be expected they should afford many thoughts entirely new; but the same thought set in a different light, or applied to a different occasion, has in some degree a claim of novelty. And even where a thing hath been so well said already, that it cannot easily be mended, the revival of a fine thought often affords a pleasure and entertainment to the mind, though it can have no longer the claim of novelty. Cicero, in his treatise of an orator, among several other encomiums which he there gives to Crassus, says of him: "Crassus always excelled every other person, but that day he excelled himself." He means as an orator. But elsewhere he applies the same thought to Cæsar, upon another account; and with some addition to it. "You had (says he) before conquered all other conquerors by your equity and clemency, but to-day you have conquered yourself; you seem to have vanquished even victory herself, therefore you alone are truly invincible." This thought, with a little variation of the phrase, has since appeared in several later writers; and it is now grown common to say of a person, who excels in any way, upon his doing better than he did before, that he has outdone himself. The like has happened to another thought, which, with a little alteration, has been variously applied. It was said by Varro, *That if the Muses were to talk Latin, they would talk like Plautus*. The younger Pliny, applying this compliment to a friend of his, says, *His letters are so finely written, that you would think the Muses themselves talked Latin*. And Cicero tells us, *It was said of Xenophon, that the Muses themselves seemed to speak Greek with his voice*. And elsewhere, *that Philosophers speak, if Jupiter speaks Greek, he must speak like Plato*. The thought is much the same in all these instances, and has been since revived by some modern writers.

II. We shall now consider the *language* proper for the middle style. And in general it may be observed, that as the proper subjects of it are things of weight and importance, though not of that exalted nature as wholly to captivate the mind and divert it from attending to the diction; so all the ornaments of speech, and beauties of eloquence, have place here.

And first with regard to elegance, it is plain that a different choice of words makes a very great difference in the style, where the sense is the same. Sometimes

Elocution. one single word adds a grace and weight to an expression, which, if removed, the sense becomes flat and lifeless. Now such words as are most full and expressive, suit best with this character. Epithets also, which are proper and well chosen, serve very much to beautify and enliven it, as they enlarge the ideas of things, and set them in a fuller light.

The most accurate composition, in all the parts of it, has place here. Periods, the most beautiful and harmonious, of a due length, and wrought up with the most exact order, just cadency, easy and smooth connection of the words, and flowing numbers, are the genuine ornaments, which greatly contribute to form this character.

But the principal distinction of style arises from tropes and figures. By these it is chiefly animated and raised to its different degrees or characters, as it receives a lesser or greater number of them; and those either more mild, or strong and powerful.

As to tropes, those which afford the most lively and pleasing ideas, especially metaphors, suit the middle character. It is a pretty remark, which has been made by some critics upon two verses of Virgil; one in his *Eclogues*, and the other in his *Georgics*. The former of these works is for the most part written in the low style, as the language of shepherds ought to be; but the latter in the middle style, suitable to the nature of the subject, and the persons for whom it was designed, the greatest men in Rome not thinking it below them to entertain themselves with rural affairs. Now in the *Eclogue*, as some copies read the verse, the shepherd, complaining of the barrenness of his land, says:

Infelix lolium et steriles nascuntur avenæ.

In English thus:

Wild oats and darnel grow instead of corn.

But in the *Georgic*, where the same sense is intended, instead of the proper word *nascuntur*, grow, the author substitutes a metaphor, *dominantur*, command, and says:

Infelix lolium et steriles dominantur avenæ.

That is in English:

Where corn is sown, darnel and oats command.

It was fit and natural for the shepherd to express his sense in the plaiest terms; and it would have been wrong to represent him going so far out of his way, as to fetch a metaphor from government, in talking upon his own affairs. But in the *Georgic*, where the poet speaks in his own person, the metaphor is much more beautiful, and agreeable to the dignity of the work. This instance may shew in some measure how the style is heightened by tropes, and the same thought may be accommodated to the several characters of style by the different manner of expression.

The like may also be said of figures either of words or sentences, in reference to this character; which admits of the finest descriptions, most lively images, and brightest figures, that serve either for delight, or to influence the passions without transport or ecstacy, which is the property of the sublime. This is indeed the proper seat of such embellishments, which support and make up a principal part of the middle or florid style. Having treated largely upon these in several

preceding chapters, we shall here only briefly mention some of the most considerable.

Descriptions are not only a great ornament to a discourse, but represent things in a very lively and agreeable manner. In what a beautiful light has Cicero placed the polite arts and sciences, when, describing them from their effects, he thus represents to us the great advantages, as well as pleasure, which they afford to the mind? "Other studies neither suit with all times, nor all ages, nor all places: but these improve youth, delight old age, adorn prosperity, afford a refuge and solace in adversity; please at home, are no hindrance abroad; sleep, travel, and retire with us." And they often affect us very powerfully, when they are addressed to the senses. Quintilian has painted the calamities of a city taken by storm in the brightest and strongest colours, which he represents by "Flames spreading themselves over the houses and temples, the cracking of falling buildings, and a confused noise in carrying off the booty, captives driven before their victors, mothers endeavouring to guard their infants, and quarrels among the conquerors where the plunder is largest." This seems to be a very natural, as well as moving, image of so dreadful a calamity.

Prosopopæia is another very strong and beautiful figure, very proper for this character. Seneca has a fine instance of it in his *Consolatory letter to Marcia*, upon the death of her son. After many arguments he had made use of to alleviate her grief, he at last introduces her father, Crematius Cordus, as thus addressing to her: "Imagine your father (says he) from the celestial regions, speaking to you in this manner: Daughter, why do you so long indulge your grief? why are you so ignorant, as to think it unhappy for your son, that, weary of life, he has withdrawn himself to his ancestors? Are you not sensible what disorders fortune occasions every where? and that she is kindest to those who have least concern with her? Need I mention to you princes who had been extremely happy had a more timely death secured them from impending evils? or Roman generals, who wanted nothing to consummate their glory, but that they lived too long? Why then is he bewailed longest in our family, who died most happily? There is nothing, as you imagine, desirable among you, nothing great, nothing noble; but, on the contrary, all things are mean, full of trouble and anxiety, and partake very little of the light which we enjoy." This advice was very suitable for a philosopher; and he seems to have chosen this way of introducing it, to enforce the argument drawn from the happiness of good men in a future state, from the testimony of a person who was actually in the possession of it.

Similitudes and comparisons are another great ornament of this style, and oftenest found here. Nothing can be finer than the comparison between those two great orators, Demosthenes and Cicero, made by Quintilian, when he says: "Demosthenes and Cicero differ in their elocution; one is more close, and the other more copious; the former concludes more closely."

cifically, and the latter takes a larger compass; the one always with pungency, and the other generally with weight; one can have nothing taken from him, and the other nothing added to him; the latter has more of art, and the former more of nature. But this must be allowed to Demosthenes, that he made Cicero in a great measure what he was. For as Tully gave himself wholly to an imitation of the Greeks, he seems to me to have expressed the force of Demosthenes, the fluency of Plato, and the pleasantries of Ilocrates." Similitudes, taken from natural things, serve very much to enliven the style, and give it a cheerfulness; which is a thing so common and well known, that we need not stay to give any instances of it.

109 *Antithesis*, or opposition, both in the words and sense, has often the like beautiful effect. There is an agreeable contrast in that passage of Seneca: "Cæsar does not allow himself many things, because he can do all things; his watching defends all others sleep, his labour their quiet, his industry their pleasure, his business their ease; since he has governed the world, he has deprived himself of it." Had he said no more than only in general, that, *Cæsar does not allow himself many things, because he can do all things*, it might have passed for a fine thought; but, by adding so many particulars, all in the same form of expression, and beginning each member with the same word, he has both enlarged the idea, and beautified the antithesis, by a bright verbal figure.

These, and such like florid figures, are sometimes found in historians, but oftener in orators; and indeed this middle character, in the whole of it, is best accommodated to the subjects of history and oratory.

CHAP. VII. *Of the Sublime Style.*

210 *The sublime* is the most noble, as well as the most difficult part, of an orator's province. It is this principally which Cicero requires in his perfect orator, whom he could not describe in words, but only conceive of in his mind. And indeed, the noblest genius and greatest art are both requisite to form this character. For where nature has been most liberal in furnishing the mind with lofty thoughts, bright images, and strong expressions; yet without the assistance of art there will sometimes be found a mixture of what is low, improper, or misplaced. And a great genius, like a too rich soil, must produce flowers and weeds promiscuously, without cultivation. But the justest propriety, joined with the greatest strength and highest elevation of thought, are required to complete the true sublime. Art therefore is necessary to regulate and perfect the taste of those who are desirous to excel in this character.

In explaining the nature and properties of this character, we shall, as in the two former, consider first the *thoughts*, and then the *language*, in each of which it is distinguished from them.

§ 1. *Sublime, as it relates to Thoughts.*

211 Lofty and grand sentiments are the basis and foundation of the true sublime. Longinus therefore advises those who aspire to this excellence, to accustom themselves to think upon the noblest subjects. A mind that always dwells upon low and common subjects,

can never raise itself sufficiently to represent things great and magnificent in their full extent and proper light. But he who inures himself to conceive the highest and most exalted ideas, and renders them familiar to his thoughts, will not often be at a loss how to express them; for where proper words are wanting, by metaphors and images taken from other things he will be able to convey them in a just and adequate manner. What is more common than for two persons to conceive very differently of the same thing from the different manner of thinking to which they have been accustomed? After the great battle in Cilicia, between Alexander and Darius, in which the latter was routed, he sent ambassadors to Alexander with proposals of peace, offering him half his kingdom with his daughter in marriage. Parmenio, one of Alexander's chief captains, says to him upon this occasion: "For my part, was I Alexander, I would accept of these conditions." "And so would I," replies that aspiring monarch, "was I Parmenio." The half of so vast a kingdom at present, and a right of succession to the whole by marriage, was the highest ambition to which the thoughts of Parmenio could rise. But Alexander had vastly higher views, he aimed at nothing less than universal monarchy; and therefore such a proposal seemed much beneath his regard. Noble and lofty thoughts are principally those which either relate to divine objects, or such things as among men are generally esteemed the greatest and most illustrious.

Of the former sort is that of Homer, when describing the goddess Discord, he says, that she

Walks on the ground, and hides her head in clouds.

This stretch of thought, says Longinus, as great as the distance between heaven and earth, does not more represent the stature of the goddess, than the measure of the poet's genius and capacity. But such images, however beautiful in poetry, are not so proper for an orator, whose business it is to make choice of those which are suited to the nature of things and the common reason of mankind. When Numa the second king of Rome was settled in his government, and at peace with his neighbours, in order to soften the fierce and martial temper of his subjects, who had been always accustomed to wars during the reign of his predecessor Romulus, he endeavoured to impress their minds with an awe of the Deity; and for that end introduced a number of religious ceremonies, which he pretended to have received from the goddess Egeria. This must be esteemed an artful piece of policy at that time. But that sentiment is far more just and noble, with which Cicero endeavours to inspire the members of a community, in his treatise Of Laws, when he says, that "Citizens ought first to be persuaded, that all things are under the rule and government of the gods; that every affair is directed by their wisdom and power; that the highest regard is due to them from men, since they observe every one's conduct, how he acts and behaves himself, and with what temper and devotion he worships them; and that they make a difference between the pious and impious." Persons under the influence of such a persuasion, could not fail of behaving well in society. And what he says to Cæsar is no less in this style, when, interceding for Ligarius, he tells him, that

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"men in nothing approach nearer to deity, than in giving life to men." And Velleius Paterculus, speaking of Cato, gives him this sublime character, "That he was more like the gods than men; who never did a good thing, that he might seem to do it."

The other kind of lofty thoughts mentioned above, are those which relate to power, wisdom, courage, beneficence, and such other things as are of the highest esteem among mankind. "Your fortune (says Tully to Cæsar) has nothing greater than a power, nor your nature than a will, to save many." He subjoins this compliment to what we just now cited from him; and applies that to Cæsar, which was before only expressed in general, leaving him to draw the inference of his similitude to deity from the clemency of his nature. And elsewhere, as in a sort of transport for his success in defeating the conspiracy of Catiline, he thus bespeaks the Roman senate: "You have always decreed public thanks to others for their good government of the state, but to me alone for its preservation. Let that Scipio shine, by whose conduct and valour Hannibal was forced to leave Italy, and retire to Africa; let the other Scipio be greatly honoured, who destroyed Carthage and Numantia, two cities the most dangerous to this empire; let Lucius Paulus be in high esteem, whose triumphal chariot was adorned with Perseus, once a most powerful and noble prince; let Marius be in eternal honour, who twice delivered Italy from an invasion and the dread of servitude; let Pompey's name excel all these, whose actions and virtues are terminated by no other bounds but the course of the sun: yet, among all their praises, there will still some place be left for my glory; unless indeed it be a greater thing to open for us new provinces to which we may resort, than to secure a place for our victorious generals to return in triumph." And Velleius Paterculus, as if he thought no encomium too high for this great orator, laments his unhappy fate in these lofty strains, addressed to M. Antony, by whose order he was put to death: "You have taken from Cicero old age, and a life more miserable than death under your government; but his fame, and the glory of his actions and words, you have been so far from destroying, that you have increased them. He lives, and will live in the memory of all ages; and while this system of nature, however constituted, shall remain, (which scarce any Roman but himself conceived in his mind, comprehended by his genius, and illustrated with his eloquence), the praise of Cicero shall accompany it; and all posterity, while it admires his writings against you, will curse your treatment of him; and sooner shall mankind be lost to the world, than his name." It was a noble reply of Porus the Indian king, when, after his defeat by Alexander, being brought before him, and asked, *How he expected to be treated?* he answered, *Like a king.* And Valerius Maximus, speaking of Pompey's treatment of Tigranes king of Armenia after he had vanquished him, expresses it in a manner suited to the dignity and beneficence of the action, when he says, "He restored him to his former fortune, esteeming it as glorious to make kings, as to conquer them."

But the true sublime is consistent with the greatest plainness and simplicity of expression. And, generally speaking, the more plain and natural the images

appear, the more they surprise us. How successful, and yet how majestic, is that expression of Cæsar upon his victory over Pharnaces? *I came, I saw, I conquered.* But there cannot be a greater or more beautiful example of this, than what Longinus has taken notice of from Moses. "The legislator of the Jews (says he), no ordinary person, having a just notion of the power and majesty of the Deity, has expressed it in the beginning of his laws in the following words: *And God said—what? Let there be light; and there was light. Let the earth be made; and it was made.*" This instance from the divine writer, and the character here given of him by that excellent critic, is the more remarkable, as he was himself a Pagan. And certainly no laboured description could raise in the mind an higher conception of the infinite power of the Deity, than this plain and short narration. To command nature itself into being by a word, represents it at once altogether boundless and unlimited.

It sometimes very much contributes to heighten the image of a thing, when it is expressed in so undetermined a manner, as to leave the mind in suspense what bounds to fix to the thought. Of this kind is that of Cicero, when he first raises an objection against the necessity of an acquaintance with polite literature in order to form a great man, and then answers it. The objection is founded upon the examples of several great and excellent persons among the Romans, who had raised themselves to the highest pitch of honour and dignity, and been very serviceable to their country, by the help of a good genius, without the advantage of much learning. In reply to which, he allows, that, where these are not united, nature or genius is of itself much preferable, and will carry a person further in the pursuit of great and noble designs, than learning without a genius; but that both are necessary to complete and perfect a truly great man. But we shall give what he says himself on this head, by which that property of a sublime thought we are now endeavouring to explain, will appear from his manner of expression: "I acknowledge (says he) that many persons of an exalted mind and virtue have, from a divine temper, without instruction, become moderate and grave; and I add likewise, that nature, without the assistance of learning, has frequently more contributed to honour and virtue, than learning where a genius has been wanting: But yet I must say, that where the direction and improvement of learning is added to a great and excellent genius, it is wont to produce something admirable and singular, which I know not how to describe." He knew very well, that, by leaving the minds of his hearers thus in suspense, they would form to themselves higher conceptions of what he intended, than from any idea he could convey to them in words. We may add to this another example from the same great orator, where he says, "Truly, if the mind had no views to posterity, and all its thoughts were terminated by those bounds in which the space of life is confined, it would neither fatigue itself with so great labours, nor be disquieted with so many cares and watchings, nor so often expose itself to death. But there is a certain active principle in every good man, which constantly excites his mind by motives of glory; and reminds him, that the remembrance of his name is not to end
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with his life, but extend itself to all posterity." Of the like nature is that of Milton, when he describes Satan as flying from hell in quest of our earth, then newly formed. For, having repented that his wings failed him in the vast vacuity, he thus describes his fall:

Down he drops
Ten thousand fathom deep; and to this hour
Down had been falling, had not by ill chance
The strong rebuff of some tumultuous cloud,
Instinct with fire and nitre, hurried him
As many miles aloft.

Those words, by which his fall is expressed,

And to this hour
Down had been falling,

leave the mind in suspense, and unable to fix any bounds to the vacuity; and by that means raise a greater and more surprising idea of its space, than any direct expression could have done. This image is very beautiful where it stands; but so much out of the common way of thinking, as to suit better with an epic poem, than the discourse of an orator.

§ 2. *The Sublime, with regard to Language.*

112 WHAT we have to offer upon this subject, will come under the three heads of *Elegance, Composition, and Dignity*; which comprehend all the properties of style.

113 I. *Elegance.* Those words and expressions chiefly contribute to form the sublime, which are most sonorous, and have the greatest splendor, force, and dignity. And they are principally such as these. Long words, when equally expressive, are rather to be chosen, than short ones, and especially monosyllables. So to conquer or vanquish and enemy, carries in it a fuller and more grand sound, than to beat an enemy. For which reason, likewise, compound words are often preferable to simple ones. So if we say, *Cæsar's army, when he was present, was always invincible*; this manner of expression has more of sublimity in it, than should we say, *Cæsar's army, when he was present, could never be conquered*. But the ancient languages have much the advantage of ours in both these respects; for their words are generally longer, and they are abundantly more happy in their compositions. The use of proper epithets does also in a particular manner contribute to this character. For as they denote the qualities and modes of things, they are, as it were, short descriptions; so that being joined to their subjects, they often greatly enlarge and heighten their image. Thus when the character of *divine poet* is given to Homer or Virgil, or *prince of orators* to Demosthenes or Cicero; it conveys to the mind a more sublime idea of them, than the bare mention of their name.

114 II. *Composition:* The force of which, as Longinus observes, is so great, that sometimes it creates a kind of sublime where the thoughts themselves are but mean, and gives a certain appearance of grandeur to what which otherwise would seem but common. But composition consists of several parts; the first of which, in the order we have hitherto considered them, is *period*. And here the case is much the same as with animal bodies, which owe their chief excellency to the union and just proportion of their parts. The several members, when separate from each other, lose both that

beauty and force, which they have when joined together in a complete body. In like manner sublimity arises from the several parts of a period so connected, as to give force, as well as beauty, to the whole. The periods therefore in this character should be of a proper length. If they are too short, they lose their just weight and grandeur, and are gone almost before they reach the ear; as on the contrary, when they are too prolix, they become heavy and unwieldy, and by that means lose their force. But more especially, nothing superfluous ought to be admitted, which very much enervates the force of a sentence. We shall exemplify this in a passage from Herodotus, where he is giving an account of the famous battle at Thermopylæ, between the Persians and Lacedæmonians. "Dieneces," says he, "the Spartan, being told by a Trachinian, before the engagement with the Medes, that when the barbarians came to shoot their arrows, they would fly so thick as to obscure the light of the sun; he was so far from being terrified at this, that, despising their number, he replied, he was pleased with what his friend told him, since if the sun was obscured, they should fight in the shade, and not in the sun." The sense here is great and noble, but the sublimity of expression is spoilt in a great measure by those last words, and *not in the sun*, which are wholly superfluous. Cicero was sensible of this, and therefore he omits that member in relating the same story, and says only: "A Spartan, hearing that one of the Persians should say in an insulting manner, that when they came to engage, they should not be able to see the sun, for the multitude of their darts and arrows, replies, Then we shall fight in the shade." By stopping here, he gives the sentence much more life and emphasis. The next thing to be considered in composition, is the order and disposition of the several words and members of a sentence. The different placing but of one or two words will sometimes wholly destroy the grandeur of a sentence, and make it extremely flat. "This public act (says Demosthenes) dispelled the danger, which at that time, like a cloud, hung over the city." Let us vary the order a little, and read it thus: "This public act dispelled the danger, which like a cloud hung over the city at that time." What a different turn does the expression receive for the worse! The spirit and majesty of it are entirely lost.—And in placing the several parts or members, they ought to be so disposed, that what is most weighty and important should stand last. So Tully says of Catiline: "We ought to return thanks to heaven, that we have so often escaped so odious, so frightful, so dangerous a plague of the state." A thing may be odious, and frightful, and yet not dangerous; therefore he puts this in the last place, to give it the greater force, and make the deepest impression. Another thing to be attended to in composition, is the connection of the words with regard to the sound; that the pronunciation, in passing from one to another, may be most agreeable to the ear, and best suited to the nature of the subject. And as this is generally something grand and magnificent, such a contexture of them as will give the greatest force and energy to the expression is most proper for the sublime. Soft and languid sounds are very unsuitable to this character. They soothe and please the ear; but rather

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rather sink and depress the mind, than excite it to things great and noble. In this respect therefore, our tongue, by its multitude of consonants, is more suitable for sublime discourses, than some other modern languages, which abound with vowels.

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III. The last head to be considered, is the proper use of tropes and figures; which is here so necessary, that the title of *dignity* seems to have been given to this part of elocution, from the assistance it more especially affords to this character. For if, as has been observed from Longinus, compositions will sometimes create a sort of sublimity; this much oftener happens from the force and efficacy of some lively tropes and strong figures.

And as to *tropes*, bright metaphors are peculiarly suited to raise and animate the style. This is manifested from the nature of them, as they consist of contracted similes, reduced to a single word; which, if taken from things lofty and grand, must of consequence give a sublimity to the style. What can suggest to us a greater idea of the valour of Ajax, than Homer's calling him *the bulwark of the Greeks*; or of the Scipios, than when they are styled by Virgil, *the two thunderbolts of war*. A number of those, well chosen, contribute no less to the grandeur than to the beauty of discourse. Hyperbole sometimes gives the same force to an expression, if cautiously used, and so as not to exceed all appearance of truth. But the chief use of it is, where proper words will not express the just idea of the thing designed to be conveyed; and it may seem rather the offspring of necessity than choice. Of this nature is that of Herodotus, when speaking of the Lacedæmonians at Thermopylæ, he says: "They defended themselves with the swords they had left, and even with their hands and teeth, till the barbarians buried them under their arrows." It cannot be supposed strictly true, that so many arrows were thrown at them as to bury them; but having in the former part of the sentence represented their resolute defence in the strongest terms, by saying, that, naked and without arms, they engaged armed men with their hands and teeth, the following hyperbole seems not unnatural, and to intimate nothing more than what was necessary to quell such obstinate resolution and courage.

As to *figures*, whether verbal or those which consist in the sense, the nature of this character will easily direct to such as are most proper. But with respect to the latter, poets take greater liberties in the use of them than would be allowed in an orator. As their images are often formed for pleasure and delight, so they carry in them more of rapture and transport. But the orator's use of them being to set things in a stronger and clearer light, they are more sedate and moderate. Besides, an orator scarce ever has occasion for such fictitious images as we often meet with in poetry; though his ought to appear as natural, and its painting as strong and lively. We shall just mention some of the chief of those figures, which seem best suited for this purpose; though they are no less suited to the middle style, as has been shewn already, when taken from subjects of an inferior nature.

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1. *Description*. Of this Justin gives us a fine instance, in a speech of king Philip the fifth of Macedon, wherein he represents the necessity of falling up-

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on the Romans, who at that time were engaged in a war with Hannibal. "I behold," says he, "a cloud of a most dreadful and bloody war rising in Italy. I see a storm of thunder and lightning from the west, which will overspread all places with a vast shower of blood, into whatever country the tempest of victory shall drive it. Greece has undergone many violent shocks in the Persian, Gallic, and Macedonian wars; but these would all be found unworthy of regard, if the armies now engaged in Italy should march out of that country. I view the terrible and cruel wars which involve those nations through the courage of their forces, and skill of their generals. This rage and fury cannot cease by the destruction of one party, without the ruin of their neighbours. Indeed, Macedon has less reason to dread the savage conquerors, than Greece; because more prepared, and better able to defend itself: but I am sensible, those who attack each other so impetuously, will not confine their victories within those bounds; and that it will be our lot to engage the conquerors." So lively a picture of imminent and threatening danger, must needs alarm the most timorous, and excite them to a resolution to defend their country, and all that was dear to them. Such images give life and vigour to a discourse, and being artfully interwoven with proper arguments, influence the mind, and carry it away by an irresistible force; so that the hearer is not barely left to conclude the certainty of the thing, but moved by it, as it were, from ocular demonstration. The images therefore of the orator ought to be drawn from real things, or at least such as are probable; for if they are wholly fictitious and incredible, as many poetical images are, they may give pleasure, but will not convince the mind, nor sway the passions.

2. *Enumeration* has some affinity with the former figure; by which, if the several parts have each something grand in them, the whole, when brought together, and disposed in a just order, very much contributes to the sublimity. We shall produce an example of this from an English writer, containing a description of our globe, upon a survey of it after the general conflagration, which he represents in this strong light: "Such is the vanity and transient glory of this habitable world! By the force of one element breaking loose upon the rest, all the vanities of nature, all the works of art, all the labours of man, are reduced to nothing; all that we admired and loved before, as great and magnificent, is obliterated and vanishes, and another form and face of things, plain, simple, and every where the same, overspreads the whole earth. Where are now the great empires of the world, and their great imperial cities? their pillars, trophies, and monuments of glory? Shew me where they stood, read the inscription, tell me the victor's name. What remains, what impressions, what difference or distinction, do you see in this mass of fire? Rome itself, eternal Rome, the great city, the empress of the world, whose domination or superstition, ancient or modern, make a great part of the history of the earth; what is become of her now? She laid her foundations deep, and her palaces were strong and sumptuous; *she glorified herself, and lived deliciously, and said in her heart, I sit a queen, and shall see no sorrow: but her hour is come, she is wiped away from the face*

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of the earth, and buried in everlasting oblivion. But it is not cities only, and the works of mens hands; the everlasting hills, the mountains and rocks of the earth, are melted as wax before the sun, and *their place is no where found*. Here stood the Alps, the load of the earth, that covered many countries, and reached their arms from the ocean to the Black sea. This huge mass of stone is softened and dissolved, as a tender cloud into rain. Here stood the African mountains, and Atlas with his top above the clouds. There was frozen Caucasus, and Taurus, and Imaus, and the mountains of Asia; and yonder, towards the north, stood the Riphean hills, clothed in ice and snow; all these are vanished, dropped away, as the snow upon their heads.† These particulars considered separately, are all truly great and noble, and every way suited to the nature of the subject; but as they are here disposed, and rise in order, they both enlarge the idea, and heighten the image of that grand catastrophe.

† Burnet's Theory.

118 3. *Similitude* : Which serves very much for beauty and ornament; and when taken from great and sublime objects, adds a grandeur and magnificence to the things illustrated by it. We need go no farther for an example of this, than to the great critic so often mentioned already, who has treated upon the sublime in a style every way equal to the subject. He, then, comparing those two great works of Homer, his *Iliad* and *Odyssey*, thus describes them: "Homer composed his *Iliad*, when his mind was in its full strength and vigour; the whose body of the poem is dramatic, and full of action: whereas the best part of the *Odyssey* is taken up in narrations, which seem to be the genius of old age. So that one may compare him in this latter work to the setting sun, which still appears with the same magnificence, but has no longer the same heat and force." And soon after, speaking of the *Odyssey*, he says, "That piece may be called the reflux of his genius, which like the ocean ebbs, and deserts its shores." What nobler idea could possibly have been given of that great poet, than by those two similitudes of the sun and the ocean? And elsewhere, comparing those two great orators Demosthenes and Cicero, he shews the like sublimity of thought. Demosthenes, says he, "is sublime, in that he is close and concise; Cicero, in that he is diffused and extensive. The former, by reason of the violence, rapidity, strength, and fury, with which he rages and bears all before him, may be compared to a tempest and thunder; but the latter, like a great conflagration, devours and consumes all he meets, with a fire that is never extinguished, but wherever it advances continually gathers new strength."

119 4. *Antithesis*, or a sentence consisting of opposite parts, has often the same effect; as in the following instance of Cicero, where his view is to represent Pompey as a most consummate general. "Who," says he, "ever was, or need be more knowing, than this man? who from his childhood, and instruction at school, went into the army of his father, and learned the military art, in a very great war against the fiercest enemies: who while yet a boy, became a soldier under the greatest general; and when first a youth, was himself commander of a very great army: who has oftener engaged with the enemy in battle,

than any other person with his adversary in private combats; has waged more wars than others have read, and conquered more provinces than others have wished to govern: whose youth has been spent in acquiring the art of war, not by the precepts of others, but his own commands; not by defeats, but victories; not by campaigns, but triumphs."

5. *Apophrophe*. Among the articles charged against Demosthenes by his great adversary and rival Æschines, one was, that he had advised the Athenians to engage in a war against king Philip, wherein they had received a very great defeat. When he comes to answer that part of the charge, he does not say, as he might, "You have not been misled, my fellow-citizens, in exposing your lives for the liberties and safety of Greece; you are not without the most illustrious examples of such conduct: For who can say these great men were misled, who fought for the same cause in the plains of Marathon?" But instead of expressing himself thus, he gives the matter quite a different turn; and in a sort of rapture, appealing to those brave defenders of their country, says, "No, my fellow-citizens, you have not done wrong, you have not; I protest by the ghosts of those great men who fought for the same cause in the plains of Marathon." By this appeal to those ancient worthies whose memories were in the highest esteem at Athens, that it was the cause, and not the success, which rendered their actions so glorious, he artfully corroborates his assertion in a way which he knew must have the greatest weight with his audience.

As the proper subjects of this character are either divine things, or such as are in the highest esteem and regard among mankind, which often require laudatory discourses, or panegyric; these naturally admit of all the ornaments and assistance of eloquence. Which, however, must be used with discretion: for when the mind is wrapt up in thought, and stretched to the utmost of its powers in the pursuit of some noble and sublime idea, it cannot attend to all the lesser fineries and niceties of language; but, from its own vigour, and lively conception of things, will be led to express them in terms the most emphatical, and best suited to their nature. In such cases therefore, the sublimity must appear rather from the elevation of the thought, attended with a simplicity of expression, than from the ornaments and dress of the language. These things seem more natural when the mind is relaxed, and employed upon lower objects. Though, upon the whole, grandeur and majesty of expression is the proper mark of this character with relation to the language, as beauty and splendor is of the middle style.

CHAP. VIII. Of the Style of an Orator.

The style of an orator comprehends all the characters already explained, of *low*, *middle*, and *sublime*, as they are applied by him in the different parts of his province. For that the language must be suited to the nature of the subject, we have had occasion often to observe already; and the different view of the speaker or writer, necessarily occasions a variety in the manner of expression. Now an orator has three things in his view; to prove what he asserts, to represent it in an agreeable light, and to move the passions.

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But as an orator has frequently each of these views in the same discourse, we shall first give a summary description of the several characters of style, which we have formerly discoursed on more at large; that, by placing them together in one view, the difference between them may be more plain and obvious: and then we shall proceed to shew to what particular parts of a discourse each of them is more especially to be applied.

I. First, then, as shorter periods are proper in the *low style*, so less care is necessary in their turn and cadency. If a sentence now and then drop unexpectedly, and disappoint the ear, or has something rough and harsh in its composition, it is no blemish in this character. For as it is suited to the manner of common discourse, an appearance of regard to the subject, rather than the form of expression, is more becoming than any beauties of art. But the words should be well chosen and proper, suited to the ideas they are designed to convey; the expressions plain and clear, and the artificial ornaments few and modest. By *artificial ornaments* are here meant *tropes and figures*; and they are called *artificial*, because they vary from

the natural dress of language, either in the words or manner of expression: though they are often used by those who are wholly unacquainted with the rules of art; and particularly metaphors, which persons who have the least command of language frequently run into through mere necessity, for want of a sufficient stock of proper words to convey their ideas. The *low style* therefore admits of these: but care should be taken to choose such as have been rendered familiar by use, or at least where the similitude is very plain and evident. Bold or lofty metaphors, or where the allusion is dark and remote, ought to be avoided. Nor is the moderate use of the other tropes wholly disagreeable to this style. And the same thing is to be said with respect to verbal figures, or such as consist in the particular disposition of the sentence, so that if the form of it be changed, the figure is lost. Of these, such as come nearest to the natural way of expression are most proper for this style; and therefore those which consist in a jingle of words, arising from the same or a like sound, are to be avoided, as carrying in them too much the appearance of art. Those likewise which consist in a repetition of the same word have often too great a force and vehemence for this mild and gentle character. And as to figures of sentences, which do not depend on the construction of words, but lie in the sense, many of them are too gay and sprightly, and others too rapid and impetuous, for the simplicity of the *low style*; so that only the more moderate and sedate ones are to be allowed a place here. It is therefore no wonder if persons are often mistaken in their notions of this character; the beauty of which consisting in a certain plainness and simplicity, without any thing in it but what seems natural and common, every one is apt to imagine he can readily be master of it, till by experience he finds the contrary. For the case is much the same here, as in persons of fashion and good breeding, whose behaviour and address is attended with that agreeable freedom and seeming negligence, which in appearance is very easy to express, but in reality is scarce imitable by others.

As the *middle style* is more adapted for pleasure and delight, it admits of all those beauties and ornaments which soothe and entertain the mind. It has more force and energy than the *low style*, but less than the *sublime*. Smooth and harmonious numbers, well-turned periods, of a just length, delightful cadency, and accurate disposition of the words, are suited to this style. The most beautiful and shining tropes, which strike the fancy, and all those verbal figures which, by a repetition, similitude, or proportion of sounds, please and gratify the ear, help to form this character. The like is to be said as to figures of sentences: The most florid and beautiful, such as enumeration, description, similitude, and the like, are here the most proper.

But it is the *sublime style* which perfects the orator. This requires the most forcible and emphatical words, the boldest metaphors, and strongest figures. In verbal figures, repetitions, synonyms, gradations, contraries, with others of a like force and energy, are chiefly employed here. But figures of sentences are the most considerable, and principally contribute to make up this character. Among these are similes taken from

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lofty subjects, prolopopœia, apostrophe, exclamation, epiphonœa, apostopelias, and others of a like nature. But due care must likewise be taken of the form, construction, and harmony of the periods; which seem best disposed, when long and short ones are intermixed. For though round and swelling periods carry in them something grand and majestic, yet many times they move too slow to strike the passions; whereas short ones are more acute and pungent, and, by returning quick, awaken the mind, and raise the passions. But to render it complete, it must be supported with strong reason, grandeur of thought, and sentiments every way equal to the expression; without which it will be very liable to swell into bombast, and end barely in amusement.

II. Having given a short sketch of this part of the orator's furniture, we shall now go on to shew where, and in what manner, he is to make use of it. This will best appear by considering his principal view in each part of his discourse. Now the parts of a just oration (as we have formerly shewn) are six; *Introduction, Narration, Proposition, Confirmation, Confutation, and Conclusion*. Not that all these are necessary in every discourse; but it is proper they should all be mentioned, that we may consider what style is fittest for them, when they are necessary.

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In the *introduction*, the orator has three things before him; to gain the esteem of his hearers, to secure their attention, and to give them some general notion of his subject. To set out modestly, is undoubtedly the most likely way to recommend himself. For to attempt to inflame an audience, before they are prepared for it, or see the reason of much warmth, is highly improper. A prudent speaker will, like Demosthenes, begin with temper, and rise gradually, till he has insensibly warmed his hearers, and in some degree engaged their affections in his favour. So that this part scarce rises above the middle style. And if it carry in it an air of pleasantry and good-humour, it is generally the more apt to engage the attention.

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The *introduction* is usually followed by the *narration*, or a recital of such things as either preceded, accompanied, or followed upon the subject under consideration. Now as the qualities that recommend a narration are clearness, brevity, and probability; these sufficiently point out the style. Perspicuity arises from the choice of proper words, and such tropes as have been rendered most familiar by use; brevity requires moderate periods, whose parts are but little transposed; and a plain and simple dress, without ornament or colouring, is best suited to represent things probable: all which are the properties of the low style. And therefore Cicero says, *narrations come pretty near to our ordinary discourse*. Indeed, sometimes it is necessary not only to relate the facts themselves, but likewise to describe the manner in which they were performed. And then a further degree of art may be requisite to represent them with all their circumstances, and paint them to the mind in their proper colours.

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The next part in order is the *proposition*, or subject of the discourse, in which there can be no room for ornament. But as it is the basis and foundation of the orator's whole design, it ought to be laid down in the

plainest and clearest terms, so as to leave no room for doubt or uncertainty what it is which he intends to discourse upon.

The next thing is *confirmation*, wherein the orator endeavours to maintain and defend his own cause, and to convince his hearers of the truth of it by reason and argument. Now the low style is certainly fittest for cool reasoning and debate. But the orator's method of reasoning often very much differs from that of the philosopher. The latter contents himself with the most plain and familiar manner of representing the truth, and thinks it sufficient if what he says be clearly understood. But the former, at the same time that he convinces the judgment, endeavours likewise to affect the passions, and that in a great variety of ways. So that in this part of the discourse the style is very different, according to the nature and circumstances of the cause. Sometimes, while he is dwelling upon the proof of a thing, he talks coolly, and reasons with the sedateness of a philosopher; and where any part of his argument appears doubtful or obscure, he endeavours with the same even temper to explain and clear it up. But frequently he intermixes with his proofs all the arts of persuasion, and embellishes his reasons with the greatest ornaments and beauties of eloquence.

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Confirmation is usually followed by *confutation*, in which the orator endeavours to enervate and overthrow all that has been advanced in favour of the opposite side of the question. But as the style is much the same here as in the former part; what has been said upon this, may be sufficient for this likewise.

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The last part above-mentioned is the *conclusion*. This consists of two branches, *recapitulation and address*. Recapitulation is a short recital of the several arguments, or at least the chief of them, which were before advanced in support of the cause; that, being brought together into a narrow compass, they may appear in a stronger light. Wherefore the language here ought rather to be forcible and strong than florid, because brevity and conciseness is a necessary quality. The other branch of the conclusion consists in an address to the passions, and is wholly persuasive; for which the speaker is now entirely at leisure. Indeed, this is often done occasionally in other parts of the discourse, particularly in the introduction and confirmation: But as in the former of these, his view is principally to secure the good opinion of the hearers, and excite their attention; and in the latter to defend his own side of the question by reason and argument; when these two points are gained, he has nothing left but to prevail with them to fall in with his design, and declare for him. And the best way to attain this is, by engaging their passions in his interest. Hence then, to use Quintilian's words, "All the springs of eloquence are to be opened. Now we are past the rocks and shallows, all the sails may be hoisted. And as the greatest part of the conclusion consists in illustration, the most pompous language and strongest figures have place here."

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All the variety above-mentioned, however, is not always necessary. Regard must be had to the nature of the subject, the time, place, persons, and other circumstances; by all which the style is to be regulated.

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To discourse in a lofty and grand way upon a common topic, or in a low and flat manner upon a sublime argument, are both equally injudicious. Cicero refers us to some discourses of his own, as instances of each kind. His oration for Cæcina, he says, is written in the low style, that for the Manilian law in the middle style, and that for Rabirius in the sublime; and his Actions against Verres, with some others, are patterns of the variety here mentioned. And he gives us a very comprehensive description of a perfect orator in a very few words, when he says: "He is one who can speak upon a low subject acutely, upon a lofty subject with sublimity, and upon a moderate subject temperately." By which he means no more, than one who is master of the three characters here described, and knows when and how to use them. But although he

mentions several among the Greeks, and some few among the Romans, who excelled in one or other of these different kinds; yet one who excelled in them all, he supposes never to have existed, except in the imagination. The reason perhaps may be, because each of them seems to require a very different genius, so that it is scarce possible for the same person to succeed in them all. Since therefore it is so rare and difficult a matter to gain the command of each in any good degree, it is better perhaps for every one to pursue that which nature seems most inclined to, and to excel in it, than to strive against their genius. For every kind has its perfections; and it is more commendable to be master of one thing, than to do several but indifferently.

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PART IV. OF PRONUNCIATION.

CHAP. I. Of Pronunciation in general.

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PRONUNCIATION is also called *Action* by some of the ancients. Though if we attend to the proper signification of each of these words, the former respects the voice, and the latter the gestures and motions of the body. But if we consider them as synonymous terms, in this large sense pronunciation or action may be said to be, *a suitable conformity of the voice, and the several motions of the body, in speaking, to the subject matter of the discourse.*

The best judges among the ancients have represented this as the principal part of an orator's province, from whence he is chiefly to expect success in the art of persuasion. When Cicero, in the person of Crassus, has largely and elegantly discoursed upon all the other parts of oratory, coming at last to speak of this, he says: "All the former have their effect as they are pronounced. It is the action alone that governs in speaking; without which the best orator is of no value, and is often defeated by one in other respects much his inferior." And he lets us know, that Demosthenes was of the same opinion, who, when he was asked what was the principal thing in oratory, replied, *Action*; and being asked again a second and a third time, what was next considerable, he still made the same answer." By which he seemed to intimate, that he thought the whole art did in a manner consist in it. And indeed, if he had not judged this highly necessary for an orator, he would scarce have taken so much pains in correcting those natural defects, under which he laboured at first, in order to acquire it. For he had both a weak voice, and likewise an impediment in his speech, so that he could not pronounce distinctly some particular letters. The former of which defects he conquered, partly by speaking as loud as he could upon the shore, when the sea roared and was boisterous; and partly, by pronouncing long periods as he walked up-hill; both which methods contributed to the strengthening of his voice. And he found means to render his pronunciation more clear and articulate, by the help of some little stones put under his tongue. Nor was he less careful in endeavouring to gain the habit of a becoming and decent gesture; for which purpose he used to pronounce his discourses

alone before a large glass. And because he had got an ill custom of drawing up his shoulders when he spoke; to amend that, he used to place them under a sword, which hung over him with the point downward. Such pains did this prince of the Grecian orators take to remove those difficulties, which would have been sufficient to discourage an inferior and less aspiring genius. And to how great a perfection he arrived in his action, under all these disadvantages, by his indefatigable diligence and application, is evident from the confession of his great adversary, and rival in oratory, Æschines. "Who, when he could not bear the disgrace of being worsted by Demosthenes in the cause of Ctesiphon, retired to Rhodes. And being desired by the inhabitants to recite to them his own oration upon that occasion, which accordingly he did; the next day they requested of him to let them hear that of Demosthenes; which having pronounced in a most graceful manner, to the admiration of all who were present, "How much more, (says he,) would you have wondered, if you had heard him speak it himself!" By which he plainly gave Demosthenes the preference in that respect. We might add to these authorities the judgment of Quintilian, who says, that "it is not of so much moment what our compositions are, as how they are pronounced; since it is the manner of the delivery, by which the audience is moved." And therefore he ventures to assert, that, "an indifferent discourse, assisted by a lively and graceful action, will have greater efficacy than the finest harangue, which wants that advantage."

The truth of this sentiment of the ancients, concerning the power and efficacy of pronunciation, might be proved from many instances; but one or two may here suffice. Hortensius, a cotemporary with Cicero, and while living next to him in reputation as an orator, was highly applauded for his action. But his orations after his death, as Quintilian tells us (for we have none of them now remaining), did not appear answerable to his character; from whence he justly concludes, there must have been something pleasing when he spoke, by which he gained his character, which was lost in reading them. But perhaps there is scarce a more considerable instance of this than in Cicero himself. After the death of Pompey, when

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Cæsar had got the government into his own hands, many of his acquaintance interceded with him in behalf of their relations and friends, who had been of the contrary party in the late wars. Among others, Cicero solicited for his friend Ligarius; which Tubero understanding, who owed Ligarius a grudge, he opposed it, and undertook to represent him to Cæsar as unworthy of his mercy. Cæsar himself was prejudiced against Ligarius; and therefore, when the cause was to come before him, he said, "We may venture to hear Cicero display his eloquence; for I know the person he pleads for to be an ill man, and my enemy." But, however, in the course of his oration, Cicero so worked upon his passions, that by the frequent alteration of his countenance, the emotions of his mind were very conspicuous. And when he came to touch upon the battle of Pharsalia, which had given Cæsar the empire of the world, he represented it in that moving and lively manner, that Cæsar could no longer contain himself, but was thrown into such a fit of shivering, that he dropped the papers which he held in his hand. This was the more remarkable, because Cæsar was himself one of the greatest orators of that age, knew all the arts of address, and avenues to the passions, and consequently was better prepared to guard against them. But neither his skill, nor resolution of mind, was of sufficient force against the power of oratory; but the conqueror of the world became a conquest to the charms of Cicero's eloquence; so that, contrary to his intention, he gave into his plea, and pardoned Ligarius. Now that oration is still extant, and appears exceedingly well calculated to touch the soft and tender passions, and springs of the soul; but we believe it can scarce be discernible to any in reading it, how it should have had so surprising an effect; which must therefore have been chiefly owing to the wonderful address and conduct of the speaker.

The more natural the pronunciation is, it will of consequence be the more moving, since the perfection of art consists in its nearest resemblance to nature. And therefore it is not without good reason, that the ancients make it one qualification of an orator, that he be a good man; because a person of this character will make the cause he espouses his own, and the more sensibly he is touched with it himself, his action will be the more natural, and by that means the more easily affect others in the same manner. Cicero, speaking upon this subject, says: "It is certain that truth (by which he means nature) in every thing excels imitation; but if that was sufficient of itself in action, we should have no occasion for art." In his opinion therefore (and who was ever a better judge?) art in this case, as well as in many others, if well managed, will assist and improve nature. But that is not all; for sometimes we find the force of it so great and powerful, that, where it is wholly counterfeit, it will for the time work the same effect as if it was founded in truth. This is well known to those who have been conversant with the representations of the theatre. In tragedies, though we are sensible that every thing we see and hear is feigned and counterfeit, yet such is the power of action, that we are oftentimes affected by it in the same manner as if they were all realities. Anger and resentment at the appearance of cruelty, concern and solicitude for distressed virtue, rise in our breasts; and

tears are extorted from us for oppressed innocence: though at the same time, perhaps, we are ready to laugh at ourselves for being thus decoyed. If art then has so great an influence upon us, when supported only by fancy and imagination; how powerful must be the effect of a just and lively representation of what we know to be true and real?

How agreeable it is both to nature and reason, that a warmth of expression and vehemency of motion should rise in proportion to the importance of the subject and concern of the speaker, will further appear, by looking back a little into the more early and simple ages of the world. For the higher we go, the more we shall find of both. We shall give the observation of a very great man upon this head, in his own words. "The Romans (says he) had a very great talent this way, and the Greeks a greater. The eastern nations excelled in it, and particularly the Hebrews. Nothing can equal the strength and vivacity of the figures they employed in their discourse; and the very actions they used to express their sentiments; such as putting ashes on their heads, and tearing their garments, and covering themselves with sackcloth under any deep distress and sorrow of mind. I do not speak of what the prophets did to give a more lively representation of the things they foretold, because such figurative actions were the effect of divine inspiration. But even in other cases we find those people understood much better than we do how to express their grief, and fear, and other passions. And hence, no doubt, arose those surprising effects of eloquence, which we never experience now." Thus far this excellent writer. And what he says here with respect to the actions of the eastern nations, was in a good measure customary among the Greeks and Romans; if not entirely of the same kind, yet perhaps as vehement and expressive. They did not think language of itself sufficient to express the height of their passions, unless enforced by uncommon motions and gestures. Thus, when Achilles had driven the Trojans into their city with the greatest precipitation and terror, and only Hector ventured to tarry without the gates to engage him; Homer represents both king Priam and his queen under the highest consternation for the danger of their son. And therefore, in order to prevail with him to come into the city, and not fight with Achilles, they not only treat him from the walls in the most tender and moving language imaginable; but he tears off his grey locks with his hands; and she in a flood of tears exposes her breasts, and adjures him by those paps which suckled him, to comply with their request. The poet knew very well, that no words of themselves could represent those agonies of mind he endeavoured to convey, unless heightened by the idea of such actions as were expressive of the deepest sorrow. And indeed this was anciently esteemed so requisite in an orator, that in matters of importance he was scarce thought to be in earnest, who wanted it. In one of Cicero's orations, he does not stick to argue in that manner with his adversary. "Would you talk thus (says he) if you was serious? Would you, who are wont to display your eloquence so warmly in the danger of others, act so coldly in your own? Where is that concern, that ardour, which used to extort pity even from children? Here is no emotion either of mind

Dial. of Eloquence, p. 92.

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or body; neither the forehead struck, nor the thigh, nor so much as a stamp of the foot. Therefore, you have been so far from inflaming our minds, that you have scarce kept us awake."

As action therefore was judged so necessary a qualification in an orator among the ancients, so they made use of several methods and expedients for the better attaining it. The principal of which we shall briefly mention.

Decency of pronunciation is an habit. And as all habits are gained by time, so the sooner they are learned, they are generally acquired with greater ease. For while persons are young, they are not only more flexible, and capable of any particular bent, but they are likewise free from the trouble of encountering and subduing contrary habits, which doubles the labour, and increases the difficulty of attaining any laudable quality. Quintilian was very sensible of this in the case here before us; and therefore, in order to have persons trained up to it, he begins with them in their childhood, and descends so low as even to give directions how they should be taught to pronounce when they first learn to read. And he advises, that they should then be instructed where to suspend their voice, and make the proper pauses, both in distinguishing the several parts of the same sentence, and in separating one sentence from another: likewise when to raise, or sink their voice, or give it a proper inflection; to be slower or faster, more vehement or sedate, as the nature of the things may require; and that the tone of their voice be always manly and grave, but at the same time mixed with an agreeable sweetness. These things may perhaps appear in themselves small; but if duly attended to, they will be found of considerable service to bring us to a just and proper pronunciation. For in every thing that is to be attained by practice, it is a great advantage to set out right at first.

The ancients likewise had persons, whom they called *phonæsti*, whose proper business it was to teach them how to regulate and manage their voice; and others, who instructed them in the whole art of pronunciation, both as to their voice and gestures. These latter were generally taken from the theatre, being some eminent experienced actors. So Quintilian, treating of the province of these persons, says: "The comedian ought to teach them how to relate facts, with what authority to advise, with what vehemence to express anger, and with what softness compassion." And speaking of gestures, he says, "He should admonish them to raise their countenance, not distort their lips, or stretch their mouths." With several other directions of the like kind. And we are told concerning the emperor M. Antoninus, usually called the philosopher, that, *His first masters were Euphorio the grammarian, and Genuinus the comedian.*

But though they made use of actors to instruct their youth in forming their speech and gestures, yet the action of an orator was much different from that of the theatre. Cicero very plainly represents this distinction, in the words of Crassus, when, speaking of orators, he says: "The motions of the body ought to be suited to the expressions, not in a theatrical way, mimicking the words by particular gesticulations; but in a manner expressive of the general sense; with a se-

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date and manly inflection of the sides; not taken from the stage and actors, but from the exercise of arms and the palestra." And Quintilian says to the same purpose: "Every gesture and motion of the comedians is not to be imitated, nor to the same degree." They thought the action of the theatre too light and extravagant for the imitation of an orator; and therefore, though they employed actors to inform young persons in the first rudiments, yet they afterwards sent to the palestra, or schools designed on purpose to teach them a decent and graceful management of their bodies. And such schools, as Quintilian informs us, were in use both among the Greeks and Romans: Just as of later ages children learn to dance, in some measure with the same intention.

Being thus far prepared, they were afterwards sent to the schools of the rhetoricians. And here, as their business was to cultivate their style, and gain the whole art of eloquence; so particularly to acquire a just and accurate pronunciation by those exercises, in which for that end they were constantly employed. And as the Greeks were most celebrated for their skill in all the polite arts, and especially oratory; the Roman gentry and nobility generally sent their sons abroad, and placed them under the tuition of some Grecian master, to instruct them in the art of speaking, and by that means to fit them for the service of their country, either in the courts of judicature or the senate. Thus Cicero was sent to Rhodes, to study under the famous Molo, and Brutus under Pamphylus; Cæsar was going to the same place when taken by pirates; and Augustus afterwards studied there under Apollodorus.

Nor, after all this pains and industry, did they yet think themselves sufficiently qualified to take upon them the character of orators. But it was their constant custom to get together some of their friends and acquaintance who were proper judges of such performances, and declaim before them in private. The business of these persons was to make observations both on their language and pronunciation. And they were allowed the greatest freedom to take notice of any thing they thought amiss, either as to inaccuracy of method, impropriety of style, or indecency of their voice or actions. This gave them an opportunity to correct any such defects at first, before they became habitual. What effects might not justly be expected from such an institution? Persons trained up in this manner, with all those advantages, joined to a good natural genius, could not fail of making very complete orators. Though even after they came to appear in public, they did not lay aside the custom of declaiming. For Quintilian tells us, that *C. Cælius used to practise it daily in his tent.* And Augustus is reported to have continued it during the war of Mutina against M. Anthony. Nor is it to be supposed, that so constant an attendance to this practice was only serviceable to them in their public performances; but it must necessarily affect their whole conduct, give them a freedom of speech, easiness of address and behaviour, and render them in all respects fine gentlemen, as well as excellent orators. And from hence perhaps we may see less reason to wonder at the surprising effects of some of their discourses, when we consider what pains they took to arrive at those abilities.

Having

Having thus far treated on pronunciation in general, we shall now proceed to consider the parts of it separately; which are, *voice* and *gesture*.

CHAP. II. *Of the Voice.*

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VOICE is one kind of sounds. Now the influence of sounds, either to raise or allay our passions, is evident from music. And certainly the harmony of a fine discourse, well and gracefully pronounced, is as capable to move us, if not in a way so violent and ecstatic, yet no less powerful, and more agreeable to our rational faculties. As the business of this chapter is to offer some considerations for the just and decent management of the voice, it may not be improper in the first place to observe in general, what nature does, when free and unconstrained. As persons are differently affected when they speak; so they naturally alter the tone of their voice, though they do not attend to it. It rises, sinks, and has various inflections given it, according to the present state and disposition of the mind. When the mind is calm and sedate, the voice is moderate and even; when the former is dejected with sorrow, the latter is languid; and when that is inflamed by passion, this is raised and elevated. It is the orator's business, therefore, to follow nature, and to endeavour that the tone of his voice appear natural and unaffected. And for this end, he must take care to suit it to the nature of the subject; but still so as to be always grave and decent. Some persons continue a discourse in such a low and drawing manner, that they can scarce be heard by their audience. Others again hurry on in so loud and boisterous a manner as if they imagined their hearers were deaf. But all the music and harmony of speech lies in the proper temperament of the voice between these extremes. In order to set this matter in a just light, it will be necessary to consider the principal affections or properties of the voice, and how they are to be regulated by an orator. Now these may all be referred either to *quantity* or *quality*.

The *quantity* of the voice consists in its *highness* or *lowness*, *swiftness* or *slowness*, and the intermediate degrees between them.

Every person who speaks in public, should endeavour, if he can, to fill the place where he speaks. But still he ought to be careful not to exceed the natural key of his voice. If he does, it will neither be soft nor agreeable; but either harsh and rough, or too shrill and squeaking. Besides, he will not be able to give every syllable its full and distinct sound; which will render what he says obscure, and difficult to be understood. He should therefore take care to keep his voice within reach, so as to have it under management, that he may raise or sink it, or give it any inflection he thinks proper: Which it will not be in his power to do, if he put a force upon it, and strain it beyond its natural tone.

The like caution is to be used against the contrary extreme, that the voice be not dropped, and suffered to sink too low. This will give the speaker pain in raising it again to its proper pitch, and be no less offensive to the hearers. For though the music of speech consists in the variations of the voice, yet they must be gradual to render them pleasant. Such sudden and great changes at once are rather to be esteemed

chafes in speaking, than variations. Besides, as they often prevent the hearers from taking in the sense of what is said, it gives them no small uneasiness that they are obliged to stretch their attention. Many persons are too apt to be guilty of this, especially at the end of a sentence, by dropping the last word; which ought in a particular manner to be expressed distinctly, because the meaning of the whole sentence often depends upon it.

The medium between these two is a moderate and even voice. But this is not the same in all; that which is moderate in one would be high in another. Every person therefore must regulate it by the natural key of his own voice. A calm and sedate voice is generally best; as a moderate sound is most pleasing to the ear, if it be clear and distinct. But this equality of the voice must also be accompanied with a variety, otherwise there can be no harmony; since all harmony consists in variety. Nothing is less pleasing, than a discourse pronounced throughout in one continued tone of the voice, without any change or alteration. Besides, a variation of the voice is an ease to the speaker; as the body is relieved by shifting its posture. The equality therefore we are here speaking of, admits a variety of inflections and changes within the same pitch. And when that is altered, the gradations, whether higher or lower, should be so gentle and regular, as to preserve a due proportion of the parts, and harmony of the whole; which cannot be done, when the voice is suddenly varied with too great a distinction. And therefore it should move from one key to another, so as rather to glide like a gentle stream, than pour down like a rapid torrent, as an ingenious writer has well expressed it. An even voice is best fitted to keep the mind to close attention. And therefore, in subjects designed only for instruction, without any address to the passions, there is little room for a variety of voice. For the voice ought to agree with the style; and as upon such subjects this should be equal, moderate, and smooth, so should the other. Every thing, as we say, is beautiful in its season; and there is a certain propriety in things, which ought always to be regarded. And therefore, an affected variety, ill placed, is as disagreeable to a judicious audience, as the want of it, where the subject requires it. We may find some persons, in pronouncing a grave and plain discourse, affect as many different tones, changes, and variations of their voice, as if they were acting a comedy; which is doubtless a very great impropriety. But the orator's province is not barely to apply to the mind, but likewise to the passions; which require a great variety of the voice, high or low, vehement or languid, according to the nature of the passions he designs to affect. So that for an orator always to use the same tone or degree of his voice, and expect to answer all his views by it; would be much the same thing as if a physician should propose to cure all distempers by one medicine. From hence it is evident, that although various inflections and tones of the voice are requisite to make it harmonious and pleasing to the ear; yet the degree of it should differ according to the nature of the subject and design of the speaker. And, as a perfect monotony is always unpleasant, so it can never be necessary in any discourse.

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The next property of the voice above-mentioned was *swiftneſs*. That ſome expreſſions ought to be pronounced faſter and ſwifter than others, is very manifeſt. Gay and ſprightly ideas ſhould not only be expreſſed louder, but alſo faſter, than ſuch as are ſad and melancholy. And when we preſs an adverſary, the voice ſhould be brisk and quick. But to hurry on in a precipitant manner without pausing, till ſtopt for want of breath, is certainly a very great fault. This deſtroys not only the neceſſary diſtinction between ſentence and ſentence, but likewiſe between the ſeveral words of the ſame ſentence; nay, and often occasions us to expreſs our words by halves, while one is thrown ſo faſt upon another, that we are not able to give each its full and juſt ſound. By this means all the grace of ſpeaking is loſt, and in a great meaſure the advantage of hearing. For when the ears of the hearers cannot keep pace with the volubility of the ſpeaker's tongue, they will be little the better for what he ſays. Beſides, by not commanding his voice, and eaſing his breath at the proper pauses and points of diſtinction, he is often obliged to ſtop in the middle of a ſentence; and ſo divides what ſhould be continued, and joins what ſhould be ſeparated; which muſt neceſſarily deſtroy the ſenſe, and confound his diſcourſe. Young perſons are very liable to this, eſpecially at firſt ſetting out. And it often ariſes from diſſidence. They are jealous of their performances, and the ſuccels they may have in ſpeaking, which gives them a pain till it is over; and this puts them into a hurry of mind, which incapacitates them from governing their voice, and keeping it under that due regulation which perhaps they propoſed to themſelves before they began to ſpeak. And the greater degree ſuch perſons have of a native and ingenuous modeſty, accompanied with a laudable ambition to excel, they are commonly more expoſed to this. For while on the one hand they are fired with an ardent deſire to recommend themſelves, and on the other are fearful of the event, this dubious ſtate of mind is very apt to throw them off their guard, and run them into this exceſs. From which we may ſee the great advantage of having the voice well formed betimes; for when once it is become habitual to ſpeak with juſtneſs and propriety, perſons readily praſtiſe it without much attention or concern.

And as a precipitant and haſty pronunciation is culpable, ſo likewiſe on the other hand, it is a fault to ſpeak too ſlow. This ſeems to argue a heavineſs in the ſpeaker. And as he appears cool himſelf, he can never expect to warm his hearers, and excite their affections. When not only every word, but every ſyllable is drawn out to too great a length, the ideas do not come faſt enough to keep up the attention without much uneaſineſs. For till the ſenſe is completed, the mind is in ſuſpence; and, if it be held long in that ſituation, it will of courſe flag and grow tired. Indeed, in ſome caſes, it is requiſite the pronunciation ſhould be ſlower than in others; as in repreſenting things great and difficult; or in expreſſing ſome particular paſſions, as admiration or grief. But the extreme we are now ſpeaking of, is a ſlowneſs equally continued through an whole diſcourſe, which muſt neceſſarily render it flat and lifeleſs.

Now, to avoid either of the two extremes laſt men-

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tioned, the voice ought to be ſedate and diſtinct. And in order to render it diſtinct, it is neceſſary, not only that each word and ſyllable ſhould have its juſt and full ſound, both as to time and accent; but likewiſe that every ſentence, and part of a ſentence, ſhould be ſeparated by its proper pause and interval. This is more eaſy to be done in reading, from the aſſiſtance of the points; but it is no leſs to be attended to in ſpeaking, if we would pronounce in a diſtinct and graceful manner. For every one ſhould ſpeak in the ſame manner as he ought to read, if he could arrive at that exactneſs. Now the common rule given in pausing is, that we ſtop our voice at a comma till we can tell one, at a ſemicolon two, at a colon three, and at a full period four. And as theſe points are either accommodated to the ſeveral parts of the ſame ſentence, as the firſt three; or different ſentences, as the laſt; this occasions the different length of the pause, by which either the dependance of what precedes upon that which follows, or its diſtinction from it, is repreſented. And therefore, in the firſt three ſtops, the voice is rather to be ſuſpended in different degrees or meaſures of time, than entirely dropt, to ſhew that the ſenſe is not yet completed. But between ſentence and ſentence we reſpire, and begin anew. So that in long periods, the voice ſhould be favoured by beginning low and ſedately, that it may hold to the end without reſpiration; or if it will not, the breath ought to be recovered without ſinking the voice. For if once the voice drop for want of breath before the period be finiſhed, not only the beauty, but likewiſe the ſenſe of it will be loſt. Quintilian lays a great ſtreſs upon a due attention to theſe pauses; and ſays, "Though it may appear not ſo conſiderable in itſelf, yet all the other virtues of a good pronunciation are deficient without it."

Hitherto we have conſidered ſuch properties of the voice as reſpect *quantity*, we come now to ſpeak of its *qualities*. And the chief of theſe are *ſtrength* or *weakneſs*, *clearneſs* or *obſcureneſs*, *ſweetneſs* or *harſhneſs*, *ſmoothneſs* or *roughneſs*. Now, one half of theſe is what every one would willingly chooſe, as he would wiſh to be free from the others. But it is not in our power to give ourſelves what qualities of the voice we pleaſe; but only to make the beſt uſe we can of what nature has beſtowed upon us. However, ſeveral defects of the voice are capable of being helped by care and proper means; as, on the other hand, the beſt voice may be greatly hurt by ill management and indiſcretion. Temperance is a great preſervative of the voice, and all exceſs is highly prejudicial to it. The voice muſt neceſſarily ſuffer, if the organs of ſpeech have not their proper tone. And in order to their having this, they muſt be kept in a due temperature; that is, they muſt neither be too moiſt nor too dry. If they abound with fluids, theſe will obſtruct the clearneſs of the voice, and render it obſcure and confuſed; and if they are parched with drought, the voice will be harſh and rough. Now all exceſſes, as well as ſome bodily indiſpoſitions, are apt to affect the organs one or other of theſe ways.

A ſtrong voice is very ſerviceable to an orator, becauſe, if it want ſome other advantages, he is, however, capable to make himſelf heard. And if at any time he is forced to ſtrain it, he is in leſs danger of its

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falling him before he has finished his discourse. But he who has a weak voice, should be very careful not to strain it, especially at first. He ought to begin low, and rise gradually to such a pitch as the key of his voice will well carry him, without being obliged to sink again afterwards. Frequent inflections of the voice will likewise be some assistance to him. But especially he should take care to speak deliberately, and ease his voice, by allowing due time for respiration at all the proper pauses. It is an extreme much less inconvenient for such a person rather to speak too slow, than too fast. But this defect of a weak voice is sometimes capable of being helped, by the use of proper methods; as is evident from the instance of Demosthenes, before-mentioned.

A voice is said to be *clear*, when the organs of speech are suited to give every single letter, and all the combinations of them in syllables and words, their proper and distinct sound. Such a voice is very pleasing and agreeable to the hearers; and no less an happiness to the speaker, as it saves him a great expence of spirits. For a moderate voice, if clear, will be as distinctly heard, as one much louder, if thick and obscure. Which is a great advantage to the speaker, because he can better keep his voice under command, and modulate it at pleasure, as the several parts and circumstances of his discourse may require. On the contrary, an obscure and confused voice is not always occasioned from a deficiency in the organ; but, many times, is the effect of custom and a bad habit. Some persons, either from want of due care in their education at first, or from inadvertency and negligence afterwards, run into a very irregular and confused manner of expressing their words; either by misplacing the accent, confounding the sound of the letters, or huddling the syllables one upon another, so as to render what they say often unintelligible. Indeed, sometimes this arises from a natural defect, as in the case of Demosthenes; who found a method to rectify that, as well as the weakness of his voice. But in faults of this kind, which proceed from habit, doubtless the most likely way to mend them is to speak deliberately.

A full voice is not the same, as a strong, nor a loud voice. It fills the ear, but it is often not pleasant. And therefore to render it so, as well as audible, it should be frequently varied. However, this seems better suited to the character of an orator, than a small and shrill voice; because it has something in it more grave and manly. And those, who have the misfortune of a very small voice, should be cautious of raising it to too high a pitch, especially at once; because the sudden compression of the organ, is apt to occasion a squeaking and very disagreeable sound.

A soft and smooth voice is of all the most musical, especially if it be flexible. And on the contrary, nothing is less harmonious than a voice that is harsh and rough. For the one grates as disagreeably upon the ear, as the other gives it pleasure and delight.

From the consideration of these several properties of the voice, we may conclude that to be the best, and fittest for an orator, which is moderate, distinct, firm, clear, and smooth, and withal easily flexible to the several degrees and variations of sound which

every part of the discourse may require.

CHAP. III. Of Gesture.

By this is meant, a suitable conformity of the motions of the countenance, and several parts of the body in speaking, to the subject-matter of the discourse. The word *gesture* is here used in a larger sense than is ordinarily done in common language. For we rarely make use of that word to denote the motions of the countenance, or any parts of it; but as these make a considerable part of our present subject, they must here be comprehended under this term.

It is not agreed among the learned, whether voice or gesture has the greater influence upon us. But as the latter affects us by the eye, as the former does by the ear, gesture in the nature of it seems to have this advantage, that it conveys the impression more speedily to the mind; for the sight is the quickest of all our senses. Nor is its influence less upon our passions; nay, in some instances it appears to act more powerfully. A cast of the eye shall express desire in as moving a manner, as the softest language; and a different motion of it, resentment. To wring the hands, tear the hair, or strike the breast, are all strong indications of sorrow. And he who claps his hand to his sword, throws us into a greater panic than one who only threatens to kill us. Nor is it in some respects less various and extensive than language. Cicero tells us, he often diverted himself by trying this with Roscius the comedian; who could express a sentence as many ways by his gestures, as he himself by words. And some dramas have been carried on wholly by mutes, who have performed every part by gestures only, without words, in a way very intelligent, as well as entertaining to the spectators. Well therefore might Cicero call *action* (or gesture) *the language of the body*, since it is capable in so lively a manner to convey both our ideas and passions. But with respect to oratory, gesture may very properly be called the *second part of pronunciation*; in which, as the voice should be suited to the impressions it receives from the mind, so the several motions of the body ought to be accommodated to the various tones and inflections of the voice. When the voice is even and moderate, little gesture is required; and nothing is more unnatural than violent motion, in discoursing upon ordinary and familiar subjects. The motions of the body should rise therefore in proportion to the vehemence and energy of the expression, as the natural and genuine effect of it.

But as gesture is very different and various as to the manner of it, which depends upon the decent conduct of several parts of the body; it will not be amiss to consider more particularly, the proper management of each of those parts. Now all gesture is either natural, or from imitation. By natural gesture we mean such actions and motions of the body, as naturally accompany our words, as these do the impressions of our minds. And these either respect the whole body, or some particular part of it. But before we enter upon this, give us leave just to observe, that it has been customary in all ages and countries, in making a set discourse before an assembly, to do it standing. Thus we read, that, *Abraham stood up, and spake unto the children of Heth.* And it seems as if

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if he sat down, when he had ended his speech; because, immediately after the account of their answer, it is said again, that *Abraham stood up and bowed himself to the people of the land, the children of Heth*. In like manner Homer represents the Grecian princes, as standing up, when they made a speech, either to the army, or in their councils. So when Achilles has assembled the army, to inquire into the reason of the great plague which at that time raged among them, he rises up before he begins to speak, and sits down again when he has done. After him the prophet Calchas rises, and charges it upon Agamemnon; who rising up in a passion, does not refuse to comply with what Calchas proposed, but expresses his resentment at him for saying it. And upon another occasion, both Agamemnon and Nestor do the same in council. And Cicero acquaints us, that when Lentulus had been charged in the senate, as an associate with Catiline, he stood up to make his defence. Nor does the advantage of being better heard, seem to have been the only reason for so general an agreement in this posture; but it appears likewise to have been chosen, as the most decent and respectful. Sitting carries in it an air of authority, and is therefore a posture scarce used upon such occasions, unless perhaps where that is designed to be expressed by it. Wherefore it was a thing very much resented, that when Cæsar, after he had got the power into his hands, being once addressed to the senate, either refused to rise, as some say, or as others, one of his friends held him down by his gown.

But though standing appears to be the most proper posture for speaking in public, yet it is very unbecoming for the body to be entirely without any motion like a statue. It should not long continue in the same position, but be constantly changing, though the motion be very moderate. There ought to be no appearance of stiffness, but a certain ease and pliability, naturally suiting itself to every expression; by which means, when a greater degree of motion is necessary, it will appear less sudden and vehement. For as the raising, sinking, and various inflections of the voice must be gradual; so likewise should the motions of the body. It is only on some particular occasions, that an haughty vehemence and impetuosity is proper in either case.

As to the several parts of the body, the head is the most considerable. To lift it up too high has the air of arrogance and pride; to stretch it out too far, or throw it back, looks clownish and unmannerly; to hang it downwards on the breast, shews an unmanly bashfulness, and want of spirit; and to suffer it to lean on either shoulder, argues both sloth and indolence. Wherefore in calm and sedate discourse it ought to keep its natural state, an upright posture. However, it should not be long without motion, nor yet always moving; but gently turn sometimes on one side, and sometimes on the other, as occasions requires, that the voice may be heard by all who are present; and then return again to its natural position. It should always accompany the other actions of the body, and turn on the same side with them; except when aversion to any thing is expressed, which is done by stretching out the right hand, and turning the head to the left. The ancients erected a statue of Venus in this posture, who

was called by the Greeks *αὐραμένη*, and by the Latins *Verticordia*, and in English may be termed the *forbidding Venus*. But nothing is more indecent, than violent motions and agitations of the head. And therefore, when a witty writer, who is well known among us, would convey the most ridiculous idea of a pretender to knowledge, he expresses it thus:

For having three times shook his head
To stir his wit up, thus he said.

HUBB.

But it is the countenance, that chiefly represents both the passions, and disposition of the mind. By this we express love, hatred; joy, sorrow; modesty, and confidence: by this we supplicate, threaten, soothe, invite, forbid, consent, or refuse; and all this without speaking. Nay, from hence we form a judgment not only of a person's present temper, but of his capacity and natural disposition. And therefore it is common to say, *such an one has a promising countenance, or that he promises little by his countenance*. It is true, this is no certain rule of judging; nor is it in the power of any one to alter the natural make of his countenance; however, it may put us upon endeavouring to gain the most pleasing aspect we can; since it is so natural for mankind to draw such conclusions from it; and some persons are so unhappy, as to render their countenance more disagreeable, than otherwise it would be, by ill habits.

But the several parts of the face bear their part, and contribute to the proper and decent motion of the whole. In a calm and sedate discourse, all the features retain their natural state and situation. In sorrow, the forehead and eyebrows lour, and the cheeks hang down. But in expressions of joy and cheerfulness, the forehead and eyebrows are expanded, the cheeks contracted, and the corners of the mouth drawn upwards. Anger and resentment contract the forehead, draw the brows together, and thrust out the lips. And terror elevates both the brows and forehead. As these are the natural signs of such passions, the orator should endeavour to conform to them.

But as the eyes are most active and significant, it is the advice of Cicero that the greatest care should be taken in their management. And he gives this reason for it, "Because other parts of the countenance have but few motions; whereas all the passions of the soul are expressed in the eyes, by so many different actions, which cannot possibly be represented by any gestures of the body, if the eyes are kept in a fixed posture." Common experience does in a great measure confirm the truth of this observation. We readily guess at a person's intention, or how he is affected to us, by his eyes. And any sudden change or emotion of the mind is presently followed by an alteration in the look. In speaking therefore upon pleasant and delightful subjects, the eyes are brisk and cheerful; as, on the contrary, they sink and are languid in delivering any thing melancholy and sorrowful. This is so agreeable to nature, that before a person speaks, we are prepared with the expectation of one or the other from his different aspect. So likewise in anger, a certain vehemence and intenseness appears in the eyes, which, for want of proper words to express it by, we endeavour to represent by metaphors taken from fire, the most violent and rapid element, and say in such cases, *the eyes sparkle, burn, or are inflamed*.

In expressions of hatred or detestation, it is natural to alter the look, either by turning the eyes aside, or downwards. Virgil has very justly observed this: for when he describes Æneas meeting with Dido in the Elysian shades and addressing her, he represents her disregard of him, by saying,

Disdainfully the look'd; then turning round,
Still fix'd her eyes unmov'd upon the ground.

She shewed her resentment for his former treatment of her, by not vouchsafing to look on him. Indeed, the eyes are sometimes turned downwards upon other occasions, as to express modesty. And if at any time a particular object be addressed to, whatever it be, the eyes should be turned that way. And therefore Philostratus very deservedly ridicules a certain rhetorician as guilty of a solecism in gesture, who, upon saying, *O Jupiter!* turned his eyes downward; and when he said, *O earth!* looked upward. A flaring look has the appearance of giddiness and want of thought; and to contract the eyes, gives suspicion of craft and design. A fixed look may be occasioned from intenseness of thought, but at the same time shews a disregard to the audience; and a too quick and wandering motion of the eyes denotes levity and wantonness. A gentle and moderate motion of the eyes is therefore in common most suitable, always directed to some of the audience, and gradually turning from side to side with an air of respect and modesty, and looking them decently in the face, as in common discourse: Such a behaviour will of course draw an attention. As in conversation, when a person addresses us in an handsome and becoming manner, we presently put ourselves in a posture to give what he says a proper reception. But as all the passions are in the most lively manner expressed in the eyes, their motions ought to vary according to the different nature of those passions they are suited both to discover in the speaker, and convey to his hearers; since, as the quickest access to the mind is by the sight, a proper well-timed look will sometimes sooner effect this than it can be done by words; as in discharging a cannon, we are struck with the light before we hear the sound.

As to the other parts of the body distinct from the head, the shoulders ought not to be elevated; for this is not only in itself indecent, but it likewise contracts the neck, and hinders the proper motion of the head. Nor, on the other hand, should they be drawn down, and depressed; because this occasions a stiffness both to the neck and the whole body. Their natural posture therefore is best, as being most easy and graceful. To shrug the shoulders has an object and servile air; and frequently to heave them upwards and downwards is a very disagreeable sight.

A continued motion of the arms any way, is by all means to be avoided. Their action should generally be very moderate, and follow that of the hands, unless in very pathetic expressions, where it may be proper to give them a more lively spring.

The hands need never be idle. Quintilian seems to think them as necessary and powerful in action, as Cicero does the eyes. "The hands (says he) without which all gesture is lame and weak, have a greater variety of motions than can well be expressed; for they are almost equal to our words. Do not we desire with them, promise, call, dismiss, threaten, beseech,

detest, fear, inquire, deny? Do not they express joy, sorrow, doubt, confession, penitence, measure, plenty, number, and time? Do not they excite, restrain, prove, admire, and shame? That in so great a variety of speech among all nations and countries, this seems to me the common language of all mankind." Thus far Quintilian. Now, all bodily motion is either upward or downward, to the right or left, forward or backward, or else circular. The hands are employed by the orator in all these, except the last. And as they ought to correspond with our expressions, so they ought to begin and end with them. In admiration, and addresses to heaven, they must be elevated, but never raised above the eyes; and in speaking of things below us, they are directed downwards. Side motion should generally begin from the left, and terminate gently on the right. In demonstrating, addressing, and on several other occasions, they are moved forward; and in threatening, sometimes thrown back. But when the orator speaks of himself, his right-hand should be gently laid on his breast. When no other motion is necessary, the hands should be kept about as high as the breast, so as to make near a right angle with the arm. This is not only graceful, but likewise the most easy posture, and gives the least strain to the muscles. They should never be suffered to hang down, nor to loll upon the cushion or bar. The left hand should never move alone, but accommodate itself to the motions of the right. In motions to the left side, the right hand should not be carried beyond the left shoulder. In promises, and expressions of compliment, the motion of the hands should be gentle and slow; but in exhortations and applause more swift. The hands should generally be open; but in expressions of compunction and anger they may be closed. All finical and trifling actions of the fingers ought to be avoided; nor should they be stretched out and expanded in a stiff and rigid posture, but kept easy and pliable.

Neither the breast nor the belly should be thrust out: which in itself looks ungainly, and hinders the free motion of the trunk; which ought not to be kept too stiff and upright, but easy and flexible, always suiting itself to the motions of the head and hands. The feet should continue steady, and not give the body a wavering and giddy motion by frequently shifting; tho' some persons fall into that habit without moving their feet. Curio, a Roman orator, as Cicero tells us, was addicted to this; which occasioned a friend of his once to pass a joke upon him, by asking, *Who that was talking out of a boat?* The jest is too plain to need explication; for every one knows the waving of a boat will give the body such a motion.

The gestures we have hitherto discoursed of, are such as naturally accompany our expressions. And we believe those we have mentioned, if duly attended to, will be found sufficient to answer all the purposes of our modern pronunciation. The ancients, indeed, used several more vehement actions and gestures than we are accustomed to; as we have formerly shewn. Philip the Roman orator, as Cicero informs us, did not use to prepare his discourses; but spoke, as we say, *off-hand*. And he was wont to tell his friends, "he was never fit to talk till he had warmed his arm." He doubtless, therefore, used a more violent motion with his

pronuncia- his arms and hands than is common with us. And tion. Cicero calls the arm projected the *orator's weapon*. Indeed, to extend or brandish the arm, carries in it an air of command and authority, which was not unbecoming the character of Philip, who was a person of the highest rank and quality. And therefore young orators, both among the Greeks and Romans, for a time used no motion of the arm, but kept it confined in their garment, as an argument of modesty, till age and experience allowed them to use greater freedom. Nor was it uncommon for the ancient orators to express the excess of their passions by tears. They thought nothing unbecoming that was natural; and judged it agreeable to the characters even of the bravest men, to be touched with a sense of humanity in great calamities: And therefore we find both Homer and Virgil make their greatest heroes shed tears on some occasions.

The other sort of gestures abovementioned are such as arise from imitation; as where the orator describes some action, or personates another speaking. But here great care is to be taken not to over-act his part, by running into any ludicrous or theatrical mimicry. It is sufficient for him so to represent things of this nature, as may best convey the image of them in a lively manner to the minds of the hearers; without any such change either of his actions or voice as are not suitable to his own character.

CHAP. IV. *Some particular rules for the Voice and Gesture.*

THE subject of pronunciation is of so great importance to an orator, that it can neither be too clearly laid down, nor too strongly inculcated. If we inquire into the causes of that surprising power it has over us, and by what means it so strongly affects us, this may in some measure appear by reflecting on the frame and constitution of human nature. For our infinitely great and wise Maker has so formed us, that not only the actions of the body are subject to the direction of the mind; but we are likewise endowed with various passions and affections, that excite us to pursue those things which make for our happiness, and avoid others which are hurtful to us. And as we are made for society, we are also furnished with speech, which enables us to converse one with another. And such is the contrivance of our make, and influence of our minds upon the mechanism of our bodies, that we can not only communicate our thoughts to each other, but likewise our passions. For, as Cicero well observes, "Every motion of the mind has naturally its peculiar countenance, voice, and gesture; and the whole body, every position of the face, and sound of the voice, like the strings of an instrument, act agreeably to the impression they receive from the mind." Nor is this all: but as every one is differently affected himself, he is capable to make the like impressions upon others, and excite them to the same motions which he feels in himself. As when two instruments are set to the same pitch, the strings of the one being touched, produce in the other the like sound. This common sympathy in the human frame shews how necessary it is that an orator should not only in general be well acquainted with the rules of pronunciation, but likewise know how to use them as occasion requires. For

a general knowledge of the rules of art is not of itself sufficient to perfect an artist, without a further acquaintance with the particular application of them to their several cases and circumstances. Thus, for instance, it is not enough for an orator to understand all the beauties and ornaments of language, and which of them are suited to form the several kinds of style; unless he can likewise accommodate each of those characters to their proper subject. And so likewise in pronunciation, he ought not only to know the several qualities of the voice, and proper gestures of the body; but also when and where to make use of them. For not only different subjects, but also different parts of the same discourse, and even particular expressions, often require a difference in the manner of pronunciation, both as to the voice and gesture. Having therefore treated on both these parts of pronunciation in general, it may not be amiss now to consider, how they are to be applied in each of the two respects last mentioned.

We shall begin with the parts of a discourse, and treat of them in their natural order. And here the view and design of the speaker in each of them will easily help us to see the proper manner of pronunciation.

Let us suppose then a person presenting himself before an assembly, in order to make a discourse to them. It cannot be decent immediately to begin to speak so soon as ever he makes his appearance. He will first settle himself, compose his countenance, and take a respectful view of his audience. This prepares them for silence and attention. To begin presently, and hurry on, without first allowing either himself or his hearers time to compose themselves, looks as if he was rather performing a task, than had any design to please them; which will be very apt to make them as uneasy till he has done, as he seems to be himself. Persons commonly form some opinion of a speaker from their first view of him; which prejudices them either in his favour, or otherwise, as to what he says afterwards. A grave and sedate aspect inclines them to think him serious; that he has considered his subject, and may have something to offer worth their attention. A haughty and forbidding air occasions distaste, as it looks like disrespect. A wandering giddy countenance argues levity. A dejected drooping appearance is apt to raise contempt, unless where the subject is melancholy. And a cheerful aspect is a proper prelude to a pleasant and agreeable argument.

To speak low at first has the appearance of modesty, and is best for the voice; which, by rising gradually, will with more ease be carried to any pitch that may be afterwards necessary, without straining it. However, some variation of the voice is always proper to give it an harmony. Nay, and sometimes it is not improper for an orator to set out with a considerable degree of warmth, expressed by such an elevation of the voice, and gestures of the body, as are suited to represent the emotions of his mind. But this is not ordinarily the case. We have some few instances of this in Cicero; as in his oration for Roscius Amerinus, where the heinousness of the charge could not but excite his indignation against the accusers. And so likewise in that against Piso, and the two first against Catiline, which begin in the same manner, from the resentment

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In the narration, the voice ought to be raised to somewhat an higher pitch. Matters of fact should be related in a very plain and distinct manner, with a proper stress and emphasis laid upon each circumstance, accompanied with a suitable address and motions of the body, to engage the attention of the hearers. For there is a certain grace in telling a story, by which those who are masters of it seldom fail to recommend themselves in conversation. The beauty of it consists in an easy and familiar manner of expression, attended with such actions and gestures as are suited to the nature of the things related, and help to enliven each particular circumstance and part of the discourse.

The proposition, or subject of the discourse, should be delivered with a very clear and audible voice. For if this be not plainly heard, all that follows in proof of it cannot well be understood. And for the same reason, if it be divided into several parts or branches, they should each be expressed very deliberately and distinctly. But as the design here is only information, there can be little room for gesture.

The confirmation admits of great variety, both of the voice and gestures. In reasoning, the voice is quick and pungent, and should be enforced with suitable actions. And as descriptions likewise have often a place here, in painting out the images of things, the orator should endeavour to adapt both his voice, and the motions of his body, particularly the turn of his eyes, and action of his hands, as may best help the imagination of his hearers. Where he introduces another person speaking, or addresses to an absent person, it should be with some degree of imitation. And in dialogue the voice should alter with the parts. When he diverts from his subject by any digression, his voice should be lively and cheerful; since that is rather designed for entertainment than instruction.

In confutation, the arguments of the adverse party ought first to be repeated in a plain and distinct manner, that the speaker may not seem to conceal, or avoid the force of them. Unless they appear trifling and unworthy of a serious answer; and then a facetious manner, both of expression and gesture, may be the properest way to confute them. For to attempt to answer in a grave and serious manner, what is in itself empty and ludicrous, is apt to create a suspicion of its having more in it than it really has. So when Tubero, in his accusation of Ligarius before Cæsar, had made it part of his charge, that Ligarius was in Africa during some part of the civil war between Cæsar and Pompey; Cicero in his answer, not thinking it deserved a serious reply, contents himself with barely mentioning it ironically. For thus he begins his defence of Ligarius: "Cæsar, my kinsman Tubero has laid before you a new crime, and till this day unheard of, that Q. Ligarius was in Africa." Every one must easily perceive, by the manner in which these words were pronounced, that the design of them was to make the charge appear ridiculous. But caution should be used not to represent any argument of weight in a ludicrous way, lest by so doing the speaker should more expose himself than his adversary.

In the conclusion, both the voice and gesture should be brisk and sprightly, which may seem to arise from a sense of the speaker's opinion of the goodness of his cause, and that he has offered nothing but what is agreeable to reason and truth; as likewise from his assurance that the audience agree with him in the same sentiments. In every undertaking that requires care and thought, persons are apt at first to be sedate and moderate; but when it is drawn to an end, and is near finished, it is very natural to appear more gay. If an enumeration of the principal arguments of the discourse be convenient, as it sometimes is, where they are pretty numerous, or the discourse is long; they ought to be expressed in the most clear and forcible manner. And if there be an address to the passions, both the voice and gesture must be suited to the nature of them, of which more will be said presently.

We proceed now to the consideration of particular expressions. And what we shall offer here, will be first in relation to single words, then sentences, and lastly the passions.

I. Even in those sentences, which are expressed in the most even and sedate manner, there is often one or more words which require an emphasis and distinction of the voice. Pronouns are often of this kind; as, *This is the man*. And such are many words, that denote the circumstances and qualities of things. Such as heighten or magnify the idea of the thing to which they are joined, elevate the voice; as *noble, admirable, majestic, greatly*, and the like. On the contrary, those which lessen the idea, or debase it, depress the voice, or at least protract the tone; of which sort are the words *little, mean, poorly, contemptible*, with many others. Some tropes likewise, as metaphors, and verbal figures, which consist in the repetition of a single word, should have a particular emphasis. As when Virgil says of the river Araxes, *It disdained a bridge*. And Nisus of himself in the same poet, *I, I am the man*; where the repeated word is loudest. This distinction of words, and giving them their proper emphasis, does not only render the expression more clear and intelligible; but very much contributes to the variation of the voice, and the preventing a monotony. And the different pronunciation of these words will also require a peculiar gesture.

II. In sentences, regard should be had to their length, and the number of their parts, in order to distinguish them by proper pauses. The frame and structure of the period ought likewise to be considered, that the voice may be so managed, as to give it the most musical accent. Unless there be some special reason for the contrary, it should end louder than it begins. And this difference of tone between the end of the former sentence, and the beginning of the next, not only helps to distinguish the sense, but adds to the harmony of the voice. And that the last syllables of a sentence might become more audible and distinct, was doubtless one reason why the ancient rhetoricians disliked short feet at the end of a period. In an antithesis, or a sentence consisting of opposite parts, one contrary must be louder than the other. As: "*He is gone, but by a gainful remove, from painful labour, to quiet rest; from unquiet desires to happy contentment, from sorrow, to joy; and from transitory time, to immortality.*" In a climax,

max,

may, or gradation, the voice should rise with it. So: "There is no enjoyment of property without government; no government without a magistrate; no magistrate without obedience; no obedience where every one acts as he pleases." And so in other gradations of a different form. As: "Since concord was lost, friendship was lost, fidelity was lost, liberty was lost, all was lost." And again: "You would pardon him whom the senate hath condemned, whom the people of Rome have condemned, whom all mankind have condemned." We might mention several other figurative expressions, which require a particular conformation and management of the voice; but these, we presume, with some others we shall have occasion to name presently when we come to the passions, may be sufficient to guide us in the rest. But that it may appear more evidently how necessary a different inflection and variation of the voice is in most sentences, give us leave to shew how Quintilian illustrates it, by a passage which he takes from Cicero. The place is the beginning of Cicero's defence for Milo, and the words are these: "Altho' I am apprehensive, it may seem base to discover fear when I enter upon the defence of a most courageous man; and it may appear very indecent, when Milo discovers more concern for the public safety, than for his own, not to shew a greatness of mind equal to his cause: yet this new form of the court terrifies my eyes, which cannot discern the ancient manner of the forum, and former custom of trials, whatever way they look: your bench is not surrounded with its usual attendants." This sentence consists of four members. And Quintilian supposes, that though these words are the beginning of a speech, and were accordingly expressed in a calm and submissive manner; yet that the orator used a great deal of variety in the pronunciation of their several parts. In the first member (as he imagines) his voice was more elevated in expressing the words, *a most courageous man*, than in those other parts of it, *I am apprehensive it may seem base*, and, *to discover fear*. In the second member he rose higher in saying, *when Milo discovers more concern for the public safety than for his own*; and then again as it were checked himself in what follows, *not to shew a greatness of mind equal to his cause*. The beginning of the third member, carrying a reflection in it, was spoke with a different tone of the voice, *this new form of the court terrifies my eyes*; and the other part of it more loud and distinctly, *which cannot discern the ancient manner of the forum, and former custom of trials*. And the last member was still more raised and audible, *your bench is not surrounded with its usual attendants*. And it must be supposed, that while he was saying this, he cast his eyes round the assembly, and viewed the soldiers whom Pompey had placed there; which renders the expression still more grave and solemn. If this was the manner of the ancient orators, and they were so exact and accurate in expressing their periods, and the several parts of them, as we have reason to believe they were; it must have given a very great force, as well as beauty, to their pronunciation.

III. That the passions have each of them both a different voice and action, is evident from hence; that we know in what manner a person is affected, by the tone of his voice, though we do not understand the cause of what he says, or many times so much as we

him; and we can often make the same judgment from his countenance and gestures. Love and esteem are expressed in a smooth and cheerful tone: but anger and resentment with a rough, harsh, and interrupted voice; for when the spirits are disturbed and ruffled, the organs are moved unequally. Joy raises and dilates the voice; as sorrow sinks and contracts it. Cicero takes notice of a passage in an oration of Gracchus, wherein he bewails the death of his brother, who was killed by Scipio; which in his time was thought very moving: "*Unhappy man* (says he), *whether shall I betake myself? where shall I go?* Into the capitol? that flows with my brother's blood. Shall I go home? and behold my unhappy mother all in tears and despair?" Though Gracchus had a very ill design in that speech, and his view was to excite the populace against their governors; yet (as Cicero tells us) when he came to this passage, he expressed himself in such moving accents and gestures, that he extorted tears even from his enemies. Fear occasions a tremor and hesitation of the voice; and assurance gives it strength and firmness. Admiration elevates the voice, and should be expressed with pomp and magnificence: *O surprising clemency, worthy of the highest praise and greatest encomiums, and fit to be perpetuated in lasting monuments!* This is Cicero's compliment to Cæsar, when he thought it for his purpose. And oftentimes this passion is accompanied with an elevation both of the eyes and hands. On the contrary, contempt sinks and protracts the voice. In the dispute between Cicero and Cecilius, which of them should accuse Verres, Cicero puts this contemptuous question to him: "How are you qualified, Cecilius, for such an undertaking? I will not ask, when you ever gave a proof of it; but when you so much as attempted it? Do you consider the difficulty of managing a public cause?" With much more to the same purpose. Tho' such kind of expressions require little gesture; yet sometimes a motion of the hand may not be improper, to signify disdain or averfion. We may suppose Cicero to have acted thus in his defence of Rabirius. For to shew his assurance of his client's cause, having used this expression in a very audible manner, "I wish I had it to say, that Rabirius had with his own hand killed Saturninus, who was an enemy to the Roman state;" some persons in the crowd began to raise a clamour, just as of later times hissing has been practised on the like occasions. Upon which Cicero immediately replies, "This noise does not disturb me, but please me; since it shows, though there are some weak persons, yet they are but few." Thien presently after follows the expression we refer to: "Why do not you cease your clamour, since it only discovers your folly, and the smallness of your number?" All exclamations should be violent. When we address to inanimate things, the voice should be higher than when to animated beings; and appeals to heaven must be made in a loftier tone than those to men.

These few hints for expressing the principal passions, may, if duly attended to, suffice to direct our practice in others. Though after all, it is impossible to gain a just and decent pronunciation of voice and gesture merely from rules, without practice and a imitation of the best examples. Which shews the wisdom

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dom of the ancients, in training up their youth to it, by the assistance of masters, to form both their speech and actions.

But there is one thing, which ought always to be attended to; namely, that persons should well consider their own make and genius, especially with respect to the passions. We seldom find, that any actor can excel in all characters; but if he performs one well, he is deficient in another: And therefore they are commonly so prudent as to confine themselves to such as

[From Professor Ward's *System of Oratory*.]

best suit them. The case is the same in an orator; who should therefore keep within those bounds which nature seems to have prescribed for him. Some are better fitted for action than others, and most for some particular actions rather than others; and what fits well upon one would appear very awkward in another. Every one therefore should first endeavour to know himself, and manage accordingly. Though in most cases, nature may be much assisted and improved by art and exercise.

O R C

Oratory
Orchard.

ORATORY, among the Romanists, a closet or like apartment near a bed-chamber, furnished with an altar, crucifix, &c. for private devotions.

ORB, in astronomy, denotes an hollow globe or sphere.

ORB, in tactics, is the disposing of a number of soldiers in circular form of defence. The orb has been thought of consequence enough to employ the attention of the famous marshal de Puysegur in his art of war, who prefers this position to throw a body of infantry in an open country, to resist cavalry, or even a superior force of infantry; because it is regular, and equally strong, and gives an enemy no reason to expect better success by attacking one place than another. Cæsar drew his whole army in this form, when he fought against Labienus. The whole army of the Gauls were formed into an orb, under the command of Sabinus and Cotta, when fighting against the Romans. The orb was generally formed six deep.

ORBIT, in astronomy, the path of a planet or comet, or the curve that it describes in its revolution round its central body: thus, the earth's orbit is the curve which it describes in its annual course round the sun, and usually called the *ecliptic*. See ASTRONOMY, *passim*.

ORCADES, the Orkney Islands. See ORKNEY.

ORCHARD, a garden-department, consigned entirely to the growth of standard fruit-trees, for furnishing a large supply of the most useful kinds of fruit.

In the orchard you may have, as standards, all sorts of apple-trees, most sorts of pears and plums, and all sorts of cherries: which four species are the capital orchard fruits; each of them comprising numerous valuable varieties. But to have a complete orchard, you may also have quinces, medlars, mulberries, service-trees, filberts, Spanish nuts, berberies; likewise walnuts and chestnuts; which two latter are particularly applicable for the boundaries of orchards, to screen the other trees from the insults of impetuous winds and cold blasts. All the trees ought to be arranged in rows from 20 to 30 feet distance, as hereafter directed.

But sometimes orchards consist intirely of apple-trees, particularly in the cyder-making counties, where they are cultivated in very great quantities in large fields, and in hedge-rows, for the fruit to make cyder for public supply.

And sometimes whole orchards of very considerable extent are entirely of cherry-trees. But in this case, it is when the fruit is designed for sale in some great

O R C

city, as London, &c. for the supply of which city, Orchard, great numbers of large cherry-orchards are in some of the adjacent counties, but more particularly in Kent, which is famous for very extensive cherry-orchards; many of which are entirely of that sort called *Kentish cherry*, as being generally a great bearer; others are stored with all the principal sorts of cultivated cherries, from the earliest to the latest kinds. See PRUNUS *Cerasus*.

A general orchard, however, composed of all the before-mentioned fruit-trees, should consist of a double portion of apple-trees or more, because they are considerably the most useful fruit, and may be continued for use the year round.

The utility of a general orchard, both for private use and profit, stored with the various sorts of fruit-trees, must be very great, as well as afford infinite pleasure from the delightful appearance it makes from early spring till late in autumn: In spring the various trees in blossom are highly ornamental; in summer, the pleasure is heightened by observing the various fruits advancing to perfection; and as the season advances, the mature growth of the different species arriving to perfection, in regular succession, from May or June, until the end of October, must afford exceeding delight, as well as great profit.

Of the proper Extent, Situation, and Soil, for this Department.] As to the proper extent of ground for an orchard, this must be proportioned, in some measure, to the extent of land you have to work on, and the quantity of fruit required either for private use or for public supply: so that an orchard may be from half an acre to 20 or more in extent.

With respect to the situation and aspect for an orchard, we may observe very thriving orchards both in low and high situations, and on declivities and plains, in various aspects or exposures, provided the natural soil is good: we should, however, avoid very low damp situations as much as the nature of the place will admit; for in very wet soils no fruit trees will prosper, nor the fruit be fine: but a moderately low situation, free from copious wet, may be more eligible than an elevated ground, as being less exposed to tempestuous winds; though a situation having a small declivity is very desirable, especially if its aspect incline towards the east, south-east, or southerly, which are rather more eligible than a westerly aspect; but a north aspect is the worst of all for an orchard, unless particularly compensated by the peculiar temperament or good quality of the soil.

And as for soil, any common field or pasture that pro-

Orchard. produces good crops of corn, grafs, or kitchen-garden vegetables, is fuitable for an orchard, if it fhould prove of a loamy nature, it will be a particular advantage: any foil, however, of a good quality, not too light and dry, or too heavy, ftubborn, or wet, but of a medium nature, of a foft, pliant temperature, not lefs than one fpace deep of good ftaple, will be proper for this purpofe.

Preparation of the Ground.] The preparation of the ground for the reception of trees, is by trenching; or, if for very confiderable orchards, by deep ploughing; but trench-digging, one or two fpaces, as the foil will admit, is the moft eligible, either wholly, or only for the prefent in the places where the lines of trees are to ftand, a fpace of fix or eight feet wide, all the way in each row, efpecially if it be grafs-ground, and intended to be kept in the fward; or if any under-crops are defigned to be raifed, the ground may be wholly trenched at firft: in either cafe trench the ground in the ufual way to the depth of the natural foil; and if in grafs, turn the fward clean to the bottom of each trench, which, when rotted, will prove an excellent manure.

In planting orchards, however, on grafs-grounds, fome only dig pits for each tree, capacious enough for the reception of the roots, loofening the bottom well, without the labour of digging any other part of the ground.

The ground muft be fenced fecurely againft cattle, &c. either with a good ditch and hedge, or with a paling-fence, as may be moft convenient. See HEDGES.

Method of planting the Trees.] The beft feafon for planting all the forts of fruit-trees is autumn, foon after the fall of the leaf, from about the latter end of October until December; or indeed it might be performed any time in open weather from October until March.

Chooſe principally full ftandards, with ftraight clean ftems, fix feet high; each with a branchy well-formed head, of from two or three to four or five years growth; and let ſeveral varieties of each particular ſpecies be choſen, that ripen their fruit at different times, from the earlieſt to the lateſt, according to the nature of the different forts, that there may be a proper ſupply of every fort regularly during their proper ſeaſon. Of apples and pears in particular, chooſe a much greater quantity of the autumnal and late-ripening kinds than of the early forts; but moſt of all of apples: for the ſummer-ripening fruit is but of ſhort duration, only proper for temporary ſervice; but the later-ripening kinds keep found ſome confiderable time for autumnal uſe; and the lateſt forts that ripen in October, continue in perfection for various uſes all winter, and ſeveral forts until the ſeaſon of apples come again.

Having made choice of the proper forts, and marked them, let them be taken up with the utmoſt care, ſo as to preferve all their roots as entire as poſſible; and when taken up, prune off any broken or bruifed parts of the roots, and juſt tip the ends of the principal roots, in general, with the knife, on the under ſide, with a kind of ſlope outward.

If the trees have been already headed, or fo trained as to have branched out into regular ſhoots to form each a proper head, they muſt be planted with the ſaid heads entire, only retrenching or ſhortening any

irregular or ill-placed ſhoot that takes an awkward direction, or grows acroſs its neighbours, or ſuch as may run conſiderably longer than all the reſt, &c.

The arrangement of the trees in the orchard muſt be in rows, each kind ſeparate, at diſtances according to the nature of growth of the different forts; but for the larger growing kinds, ſuch as apples, pears, plums, cherries, &c. they ſhould ſtand from 25 to 30 or 40 feet every way aſunder, though 25 or 30 feet at moſt is a reaſonable diſtance for all theſe kinds.

Each ſpecies and its varieties ſhould generally be in rows by themſelves, the better to ſuit their reſpective modes of growth: tho' for variety, there may be ſome rows of apples and pears arranged alternately, as alſo of plums and cherries; and towards the boundaries there may be ranges of leſſer growth, as quinces, medlars, filberts, &c. and the outer row of all may be walnut-trees, and ſome cheſnuts, ſet pretty cloſe to defend the other trees from violent winds.

According to the above diſtances, proceed to ſtake out the ground for making the holes for the reception of the trees; which if made to range every way, will have a very agreeable effect, and admit the currency of air, and the ſun's influence more effectually.

But in planting very extenſive orchards, ſome divide the ground into large ſquares or quarters, of different dimensions, with intervals of fifty feet wide between; ſerving both as walks, and for admitting a greater currency of air; in different quarters planting different forts of fruit, as apples in one, pears in another, and plums and cherries in others, &c. and thus it may be repeated to as many quarters for each ſpecies and its varieties as may be convenient.

As to the mode of planting the trees: A wide hole muſt be dug for each tree, capacious enough to receive all the roots freely every way without touching the ſides. When the holes are all ready, proceed to planting, one tree in each hole, a perſon holding the ſtem erect, whiſt another trims in the earth, previously breaking it ſmall, and caſting it in equally all about the roots, frequently ſhaking the tree to cauſe the mould to ſettle in cloſe about all the ſmaller roots and fibres, and ſo as to raiſe the tree gradually up, that the crown of the roots may be but two or three inches below the general ſurface; and when the hole is filled up, tread it gently, firſt round the outſide, then near the ſtem of the tree, forming the ſurface a little hollow; and then if on the top of all is laid ſome inverted turf to the width of the holes, forming it with a ſort of circular bank, three or four inches high, it will ſupport the tree, and guard the roots from drying winds and the ſummer's drought: obſerving that each tree ſtand perfectly upright, and that they range exactly in their proper rows.

ORCHESTRA, in the ancient theatres, a place in the form of a ſemicircle, where the dancing was performed. In the Greek theatres, the orchestra made part of the ſtage; but, among the Romans, it answered nearly to our pit; only that in it were diſpoſed the ſeats for the ſenators, magiſtrates, veſtals, and other perſons of diſtinction.

ORCHIS, FOOL-STONES; a genus of the diandria order, belonging to the gynandria claſs of plants. There are a great many ſpecies; but the moſt remarkable are the following.

Orchard
Orchis.

Orchis,
Ordeal.

1. The *mascula*, or male fool-stones, hath a root composed of two bulbs, crowned with oblong, broad, spotted leaves; upright-stalks, a foot high; garnished with one or two narrow amplexicaule leaves; and terminated by a long spike of reddish-purple flowers, having the petals reflexed backward; a quadrilobed crenated lip to the nectarium, and an obtuse horn. The flowers of this species possess a very agreeable odour.

2. The *morio*, or female orchis, hath a double bulbous root, crowned with oblong, ribbed, spreading leaves; erect flower-stalks, eight or ten inches high; garnished with a few amplexicaule leaves; and terminated by a short loose spike of flowers, having connivent petals, a quadrifid crenated lip to the nectarium, and an obtuse horn.

3. The *militaris*, or man-orchis, hath a double bulbous root, crowned with oblong amplexicaule leaves; erect flower-stalks, eight or ten inches high; terminated by a loose spike of ash-coloured and reddish flowers, having confluent petals; a quinquesfid, rough, spotted lip to the nectarium, and an obtuse horn. The structure of the flowers exhibit the figure of a naked man; and are often of different colours in the same flower, as ash-colour, red, brown, and dark-striped.

Culture and Properties. All the orchises are very hardy perennials, with bulbous fleshy roots. The flowers appear in May, June, and July, but principally in June: their mode of flowering is universally in spikes, many flowers in each spike; and each flower is composed of five petals in two series, and a nectarium. The season for removing them is in summer, after they have done flowering, when their leaves and stalks decay: plant them three inches deep, and let them remain undisturbed several years; for the less they are removed, the stronger they will flower.

The roots of all the species have a remarkable resemblance to the scrotum of animals, whence the name. This plant flourishes in various parts of Europe and Asia, and grows in our country spontaneously, and in great abundance. It is assiduously cultivated in the East; and the root of it forms a considerable part of the diet of the inhabitants of Turkey, Persia, and Syria. From it is made the alimentary powder called *salep*; which, prepared from foreign roots, is sold at five or six shillings per pound, though it might be furnished by ourselves at the sixth part of that price, if we chose to pay any attention to the culture of this plant. The orchis *mascula* is the most valued for this purpose. A dry and not very fertile soil is best adapted to its growth.

The properest time for gathering the roots, is when the seed is formed, and the stalk is ready to fall; because the new bulb, of which the *salep* is made, is then arrived to its full maturity, and may be distinguished from the old one, by a white bud rising from the top of it, which is the germ of the orchis of the succeeding year.

The culture of the orchis is an object highly deserving of encouragement from all the lovers of agriculture. And as the root, if introduced into common use, would furnish a cheap, wholesome, and most nutritious article of diet, the growth of it would be sufficiently profitable to the farmer. See *SALEP*.

ORDEAL, an ancient form of trial. See *TRIAL*. It was peculiarly distinguished by the appellation of

judicium Dei; and sometimes *vulgaris purgatio*, to distinguish it from the canonical purgation, which was by the oath of the party. This was of two sorts, either fire-ordeal, or water-ordeal; the former being confined to persons of higher rank, the latter to the common people. Both these might be performed by deputy: but the principal was to answer for the success of the trial; the deputy only venturing some corporal pain, for hire, or perhaps for friendship.

Fire-ordeal was performed either by taking up in the hand, unhurt, a piece of red-hot iron, of one, two, or three pounds weight; or else by walking, barefoot, and blindfold, over nine red-hot ploughshares, laid lengthwise at unequal distances: and if the party escaped being hurt, he was adjudged innocent; but if it happened otherwise, as without collusion it usually did, he was then condemned as guilty. However, by this latter method queen Emma, the mother of Edward the Confessor, is mentioned to have cleared her character, when suspected of familiarity with Alwyn bishop of Winchester.

Water-ordeal was performed, either by plunging the bare arm up to the elbow in boiling-water, and escaping unhurt thereby: or by casting the person suspected into a river or pond of cold water; and, if he floated therein without any action of swimming, it was deemed an evidence of his guilt; but, if he sunk, he was acquitted. It is easy to trace out the traditional relics of this water-ordeal, in the ignorant barbarity still practised in many countries to discover witches, by casting them into a pool of water, and drowning them to prove their innocence. And in the Eastern empire the fire-ordeal was used to the same purpose by the emperor Theodore Lascaris; who, attributing his sickness to magic, caused all those whom he suspected to handle the hot iron: thus joining (as has been well remarked) to the most dubious crime in the world, the most dubious proof of innocence.

And indeed this purgation by ordeal seems to have been very ancient, and very universal in the times of superstitious barbarity. It was known to the ancient Greeks: for in the *Antigone* of Sophocles, a person, suspected by Creon of a misdeed, declares himself ready "to handle hot iron, and to walk over fire," in order to manifest his innocence; which, the scholiast tells us, was then a very usual purgation. And Grotius gives us many instances of water-ordeal in Bithynia, Sardinia, and other places. There is also a very peculiar species of water-ordeal, said to prevail among the Indians on the coast of Malabar; where a person accused of any enormous crime is obliged to swim over a large river abounding with crocodiles, and, if he escapes unhurt, he is reputed innocent. As in Siam, besides the usual methods of fire and water ordeal, both parties are sometimes exposed to the fury of a tiger let loose for that purpose: and, if the beast spares either, that person is accounted innocent; if neither, both are held to be guilty; but if he spares both, the trial is incomplete, and they proceed to a more certain criterion.

One cannot but be astonished at the folly and impiety of pronouncing a man guilty, unless he was cleared by a miracle; and of expecting that all the powers of nature should be suspended, by an immediate interposition of Providence to save the innocent, whenever

Ordeal.

Order
Ordinary.

whenever it was presumptuously required. And yet in England, so late as king John's time, we find grants to the bishops and clergy to use the *judicium ferri, aquæ, et ignis*. And, both in England and Sweden, the clergy presided at this trial, and it was only performed in the churches or in other consecrated ground: for which Stiernhook gives the reason, *Non defuit illis opera et laboris pretium; semper enim ab ejusmodi judicio aliquid lucri sacerdotibus obveniebat*. But, to give it its due praise, we find the canon law very early directed against trial by ordeal, or *vulgaris purgatio*, as being the fabric of the devil, *cum sit contra preceptum Domini, Non tentabis Dominum Deum tuum*. Upon this authority, though the canons themselves were of no validity in England, it was thought proper (as had been done in Denmark above a century before) to diffuse and abolish this trial entirely in our courts of justice, by an act of parliament in 3 Hen. III. according to Sir Edward Coke, or rather by an order of the king in council.

ORDER, in architecture, is a system of the several members, ornaments, and proportions of columns and pilasters; or a regular arrangement of the projecting parts of a building, especially the column, so as to form one beautiful whole. See ARCHITECTURE, n° 41, &c.

ORDER is also used for a division, or class of any thing: thus the tribe of animals called *birds*, is subdivided into six orders. See ORNITHOLOGY, ZOOLOGY, &c.

Holy ORDERS, a character peculiar to ecclesiastics, whereby they are set apart for the ministry. See ORDINATION.

Military ORDERS, are companies of knights, instituted by kings and princes, either for defence of the faith, or to confer marks of honour, and make distinctions among their subjects.

Religious ORDERS, are congregations or societies of monastics, living under the same superior, in the same manner, and wearing the same habit.

ORDERS, in a military sense, all that is lawfully commanded by superior officers. Orders are given out every day, whether in camp, garrison, or on a march, by the commanding officer; which orders are afterwards given to every officer in writing by their respective sergeants.

ORDINAL, a book containing the order or manner of performing divine service.

ORDINAL Numbers, those which express order; as first, 2d, 3d, &c.

ORDINANCE, or ORDONNANCE, a law, statute, or command of a sovereign or superior: thus the acts of parliament are sometimes termed ordinances of parliament.

ORDINARY, in general, signifies common, usual; thus, an ambassador or envoy in ordinary, is one sent to reside stably, and for a number of years, in the court of some foreign prince or state, in order to keep up a good understanding, and watch over the interest of his own nation.—This term is also applied to several officers in the king's household, who attend on common occasions. Thus we say, physician in ordinary, &c.

ORDINARY, or Honourable ORDINARY, in heraldry, a denomination given to certain charges properly be-

longing to that art. See HERALDRY, p. 3588.

ORDINATES, in geometry and conics, are lines drawn from any point of the circumference of an ellipse or other conic section, perpendicularly across the axis, to the other side. See CONIC SECTIONS.

ORDINATION, the act of conferring holy orders, or of initiating a person into the priesthood by prayer and the laying on of hands.

Ordination has always been esteemed the principal prerogative of bishops, and they still retain the function as a mark of spiritual sovereignty in their diocese. Without ordination, no person can receive any benefice, parsonage, vicarage, &c. A clerk must be 23 years of age before he can have any share in the ministry; and 24 before he can be ordained, and by that means be permitted to administer the sacrament. A bishop, on the ordination of clergymen, is to examine them in the presence of the ministers who assist him at the imposition of hands; and in case any crime, as drunkenness, perjury, forgery, &c. be alleged against any one that is to be ordained, either priest or deacon, the bishop ought to desist from ordaining him. The person to be ordained is to bring a testimonial of his life and doctrine to the bishop, and give account of his faith in Latin, and both priests and deacons are obliged to subscribe the 39 articles.

The ordination-days in the church of England, are the four Sundays immediately following the Ember-weeks, viz. the first Sunday in Lent, Trinity-Sunday, and the Sundays following the first Wednesday after September 14, and December 13.

In Scotland, where there are no bishops, the power of ordination is lodged in the presbytery. See PRESBYTERY.

ORDNANCE, a general name for all sorts of great guns used in war. See GUNNERY.

Boring of ORDNANCE. Till within these 10 years, iron ordnance were cast with a cylindrical cavity, nearly of the dimensions of the caliber of the piece, which was afterwards enlarged to the proper caliber by means of steel-cutters fixed into the dog-head of a boring-bar iron. Three side-cutters equidistant were requisite to preserve the caliber straight and cylindrical; and a single cutter was used at the end of the bar to smooth the breech of the piece. In boring ordnance cast hollow, the piece was fixed upon a carriage that could be moved backwards and forwards in a direct line with the centre of a water-wheel; in this centre was fixed the boring bar, of a sufficient length to reach up to the breech of the piece, or more properly to the further end of the caliber. The carriage with the piece being drawn backwards from the centre of the water-wheel to introduce the boring and finishing bars and cutters, it is then pressed forwards upon this bar by means of levers, weights, &c. and the water-wheel being set agoing, the bar and fullers are turned round, and clean out and smooth the caliber to its proper dimensions.

Experience at last pointed out many inconveniences arising from the method of casting guns hollow, and widening the calibers by these boring bars. For the body of iron of the hollow gun, being, at casting, in contact with the core that made the caliber within-side, and with the mould without-side, began to consolidate towards these sides in the first place, sooner than in the intermediate space, where of course the contraction of

Ordinates
Ordinance.

Ordnance,
Ordon-
nance.

the iron takes place; by which means, all guns cast hollow became more or less spongy where they ought to have been most compact; and numberless cavities also were created round the cores, from stagnated air generated in them, which were too deep to be cut out by the boring.

To remedy these defects, iron ordnance is now universally cast solid, by which means the column of iron is greatly enlarged, and the grain more compressed; and the contraction of the iron becomes in the heart of the column, and consequently is cut out by the perforation for the caliber.

Plate
CXXXII.

Guns are bored out of the solid reversely from the hollow method. The piece A is placed upon two standards BB, by means of two journeys, turned round by the water-wheel C, the breech D being introduced into the centre of the wheel, with the muzzle towards the sliding carriage E, which is pressed forwards by a rack F, and weights in the same way as the gun-carriage was in hollow boring. Upon this sliding carriage is fixed, truly horizontal and central to the gun, the drill-bar G, to the end of which is fixed a carp's-tongue drill or cutter H; which, being pressed forward upon the piece whilst it is turning round, perforates the bore, which is afterwards finished with bars and cutters as the hollow guns were. The principal difficulty of perforated solid guns truly central, arises from the contraction of the iron above-mentioned; which, resisting the drill unequally, tends to throw it out of the central line.

Office of ORDNANCE, an office kept within the tower of London, which superintends and disposes of all the arms, instruments, and utensils of war, both by sea and land, in all the magazines, garrisons, and forts, in Great Britain.

The officers of the ordnance are, 1. The master-general, from whom are derived all orders and dispatches relating to the same. 2. The lieutenant-general, who receives orders from the master-general, and sees them duly executed; orders the firing of guns on days of rejoicing, and sees the train of artillery fitted out when ordered to the field. 3. The surveyor-general, who has the inspection of the ordnance, stores, and provisions of war in the custody of the store-keepers; he allows all bills of debt, keeps a check on labourers, &c. 4. The treasurer, through whose hands passes the money of the whole office, as well for payment of salaries as debentures; as also a clerk of the ordnance, and a clerk of deliveries.

ORDONNANCE, in architecture, is the composition of a building, and the disposition of its parts, both with regard to the whole, and to one another; or, as Mr Evelyn expresses it, determining the measure of what is assigned to the several apartments. Thus ordonnance is the judicious contrivance of the plan or mould; as when the court, hall, lodgings, &c. are neither too large nor too small, but the court affords convenient light to the apartments about it: the hall is of fit capacity to receive company; and the bed-chamber, &c. of a proper size. When these divisions are either too great or too small, with respect to the whole, as where there is a large court to a little house, or a small hall to a magnificent palace, and the fault lies in the ordonnance. See ARCHITECTURE.

ORDONNANCE, in painting, is used for the dispo-

sition of the parts of a picture, either with regard to the whole piece, or to the several parts, as the groups, masses, contrasts, &c. See PAINTING, n° 14.

ORE, in natural history, the compound mineral glebe, earth, stone, or other substance, which is sufficiently rich in metallic particles to be worth the while of purification, and by this means of separating the metal from it, whether gold, silver, copper, &c. See METALLURGY, Part i. sect. 2.

ORENSE, an ancient town of Spain, in the kingdom of Galicia, with a bishop's see. It is famous for its hot-baths; and is seated at the foot of a mountain, on the river Minho, over which there is a handsome bridge of one arch. W. Long. 7. 27. N. Lat. 42. 16.

ORESTES, in ancient history, king of Mycenæ, was the son of Agamemnon and Clytemnestra. At the instigation of his sister Electra, he revenged the death of his father, and did not even spare his own mother. He also killed Pyrius the son of Achilles, for taking away Hermione, who had been promised to him in marriage. It is said, that, after he had killed his mother, he went distracted; and that, to expiate his crime, he was obliged to go to the temple of Diana in the Cheroneusis Taurica. His friend Pylades accompanied him thither: when king Thoas resolving to sacrifice him to Diana, to whom human victims were offered, Pylades resolving to be sacrificed to save his friend, assured that prince that he was Orestes; while Orestes, on the contrary, to prevent the death of Pylades, maintained that he alone was the true Orestes. During this generous contest, which rendered the friendship of Orestes and Pylades the admiration of the world, Iphigenia, who presided at Diana's sacrifices, knew again her brother Orestes, and delivered him from the danger to which he was exposed. Some days afterwards, Orestes, accompanied by Pylades, slew king Thoas, seized his treasures, and took his sister Iphigenia with him into Arcadia, 1144 B. C.

ORFA, a considerable town of Diarbeck in Asia, very pleasantly situated, pretty large, and well fortified. It formerly belonged to Persia; but is now in the Turkish dominions, and is a place of very good trade. It has a stately castle standing on a hill, which makes a great shew at a distance. They pretend to shew the well where Rachel watered her father's camels when Jacob met her, and they call it *Abraham's well*. E. Long. 37. 45. N. Lat. 36. 20.

ORFORD, a town of Suffolk in England, seated on the sea-coast between two channels. It was formerly a good fishing-town, but has now lost its trade; however, it has the title of an *earldom*, and sends two members to parliament. Here is a handsome church, whose steeple is a good sea-mark; and near it are the ruins of an old castle, and an holy house, where the seamen's wives used to pray for the safety of their husbands. E. Long. 1. 33. N. Lat. 52. 15.

ORGAGNA (Andrea), an excellent Italian painter, was born at Florence in 1329. In his youth he learned sculpture; he was also a poet and an architect. He had a fruitful genius, and his manner resembled that of the other painters of his time. Most of his works are at Pisa. The most admired of them is his picture of the Last Judgment, in which he painted his friends

Ore
Orgagna

Organ.

C, D, E, F, &c. are the keys on which the fingers are placed when the organ is played: these keys lie over the horizontal bar of wood W, in which are stuck

Upon the several rows of holes which appear on the top of the upper board, there are set up an equal number of rows of pipes. The pipes of an organ are of two kinds; the one has a mouth like a flute, the other with reeds. The first, called *pipes of mutation*, consist, (1.) of a foot A A B B (fig. 3.) which is a hollow cone, that receives the wind that is to sound the pipe: (2.) To this foot is fastened the body of the

Plate
CXXX
fig. 1.

Organ.

the pipe BBDD. Between the foot and the body of the pipe is a diaphragm or partition FEF, that has a long but narrow aperture by which the wind comes out; over this aperture is the mouth BBC, whose upper lip C, being level, cuts the wind as it comes out.

The pipes are of pewter, of lead mixed with a twelfth part of tin, and of wood. Those of pewter are always open at their extremities: their diameter is very small, and their found very clear and shrill. Those of lead mixed with tin are larger; the shortest are open, the longest quite stopped; those of a mean size are partly stopped, and have beside a little ear on each side the mouth, to be drawn closer or set further asunder, in order to raise or lower the found. The wooden pipes are square, and their extremity is stopped with a valve or tampon of leather. The found of the wooden and leaden pipes is very soft; the large ones stopped are commonly of wood, the small ones of lead. The longest pipes give the gravest found, and the shortest the most acute: their lengths and widths are determined by a fixed proportion to their founds; and their divisions are regulated by a rule, which is called the *diapason*. The longest has commonly 16 feet; but in very large organs it has 32 feet. The pedal tubes are always upon, though made of wood and of lead. Whatever note any open pipe sounds, when its mouth is stopped it will found an octave lower; and a pipe of twice its capacity will likewise found an octave lower.

A reed-pipe consists of a foot AABB, (fig. 4.) that carries the wind into the shallot or reed CD, which is a hollow demi-cylinder, fitted at its extremity D, into a fort of mould, by a wooden tampon G. The shallot is covered with a plate of copper KKLL, fitted at its extremity II, into the mould, by the same wooden tampon. Its other extremity KK, is at liberty: so that the air entering the shallot makes it tremble or shake against the reed; and the longer that part of the tongue LL, which is at liberty, is made, the deeper is the found. The mould II, that serves to fix the shallot or reed, the tongue, tampon, &c. serves also to stop the foot of the pipe, and make the wind go out wholly at the reed. Lastly, in the mould is foldered the tube HH, whose inward opening is a continuation of that of the reed: the form of this tube is different in different ranks of pipes. The degree of acuteness or gravity in the found of a reed pipe, depends on the length of the tongue, and that of the pipe CK, taken from the extremity of the shallot to the extremity of the tube. The quantity or intension of the found depends on the width of the reed, the tongue, and the tube; as also on the thickness of the tongue, the figure of the tube, and the quantity of wind. To diversify the founds of the pipes, a valve is added to the port-vent, which makes the wind go out in fits or shakes. In fig. 1. X represents a flute-pipe of wood, Z a flute-pipe of metal, Y a trumpet-pipe of metal. The pipes, to prevent them from falling, pass through holes made in boards, placed upon the upper board.

The pipes are made to communicate with the wind-chest in the following manner. There are holes bored that go through the upper and lower boards, and through the slider, (when it is drawn out), into the

partition below; so that any pipes placed upon those holes will then communicate with the partition, which, by its valve, communicates with the wind-chest. But when the slider is thrust in, its holes do not answer to those in the upper and lower boards; therefore the communication is stopped, so that no wind can get to the pipe.

To every large organ there must be at least two pair of bellows, which are marked in fig. 1. by TU, TU. O, O, are the handles, moving upon the axis *nn*, *nn*. Each of these bellows consists of two boards, the lowest of which is immovable; and in this there is a valve *r*, opening inwards, and a tube leading to it, called the *conveying tube*. There is also a hole in this under board, from which a tube leads to the port-vent, which is a square tube marked 4, rising upward, and inserted into the under side of the wind-chest at 2. In the tube leading to the port-vent there is a valve that opens towards the port-vent, and suffers the air to go up the port-vent, but not to return. Now the handle O being pulled down, raises the upper board T, and the air enters through the valve *r*; and when the handle is let go, the weight of the upper board, which carries three or four pound to every square foot, continually descending, drives the air through the port-vent to the found-board: and as the bellows work alternately, one pair is constantly descending, which occasions a continual blast through the port-vent. In chamber-organs there is but one pair of bellows; but they are formed of three boards, in the manner of a smith's bellows, and so have a continual blast. All the internal structure of the organ is concealed from the sight by the front of the instrument, which stands upon the part between the numbers 3 and 6 (fig. 1.)

In every organ the number of partitions LL, MM, &c. there are in the found-board (fig. 1.) that of the valves V V, that of the rollers *s s*, or of the levers *x y* or 8 9 and their wires, and that of the keys ABC, &c. must be always equal. Large organs have commonly four or five sets of keys, beside those that belong to the pedals or large pipes, the stops to which are played by the feet. The keys of an organ are usually divided into four octaves; which are, the second sub-octave, first sub-octave, middle octave, and first octave. Each octave is divided into 12 stops or frets, of which seven are black and five white; the former mark the natural notes, and the latter the artificial notes, that is, flats and sharps. The number of keys, therefore, when there are four octaves, must be 48. Some organists add one or more stops to the first and second sub-octaves. The pedals have two or three octaves, at the option of the organist; so that the number of stops is indeterminate. The keys are placed between GG (fig. 1.), but the scheme could not contain them all. There are also as many handles *l l*, &c. rollers RR, &c. sliders *f f*, &c. as there are stops upon the organ; and it must be observed, that between the sliders *f f*, &c. there are as many sliders on the right hand, and the same number of handles and rollers, and other rows of pipes placed between LN, PQ, which could not be expressed in the figure.

The least pipes and partitions are placed toward the middle of the organ, and the greatest on the outside.

The

Organ.

The stops of an organ have various denominations, according to the sounds they are to produce; some of which are diapason, principal, fifteenth, twelfth, tearce, cornet, trumpet, French horn, vox humana, flute, bassoon, cremona, &c. There is likewise a contrivance to swell the notes of some of the stops.

When this magnificent instrument is played, the handle *O* of the bellows is first put down, which raises the upper board *T*, and gives room for the air to enter by the valve *r*. Then the other handle *O* is put down; in the mean time the board *T*, belonging to the first handle, descending, and shutting the valve *r*, drives the air through the other valve, up the port-vent, and into the wind-chest. Then drawing out any handle, as that of the flute-stop *ph*, which draws out the slider *fg*, all the pipes in the set *LN* are ready to play, as soon as the keys *C, D, E*, &c. are put down: therefore, if the key *D* be put down, it opens the corresponding valve *mV*, through which the air enters into the pipe *X*, and makes it sound. In the same manner any other pipe in the set *LN*, will found when its key is put down; but no pipe, in any other set, will found till the slider be drawn out by its corresponding handle.

Hydraulic ORGAN, denotes a musical machine that plays by water instead of wind. Of these there are several in Italy, in the grottos of vineyards. Ctesibius of Alexandria, who lived in the time of Ptolemy Evergetes, is said to have invented organs that played by compressing the air with water, as is still practised. Archimedes and Vitruvius have left us descriptions of the hydraulic organ.

ORGASM, an ecstacy, or impetuous desire of coition, occasioned by a turgescency of the feminal vessels.

ORGIA, in antiquity, feasts and sacrifices performed in honour of Bacchus, instituted by Orpheus, and chiefly celebrated on the mountains by wild distracted women called *Bacchæ*. See *BACCHANALIA*, and *DIONYSIA*.

ORGUES, in the military art, are thick long pieces of wood, pointed at one end, and shod with iron, clear one of another; hanging each by a particular rope or cord, over the gateway of a strong place, perpendicularly, to be let fall in case of the approach of an enemy.

ORGUES, is also used for a machine composed of several harquebuses or musket barrels bound together, by means whereof several explosions are made at the same time. It is used to defend breaches and other places attacked.

ORGYA, an ancient Grecian measure containing six feet.

ORIFICE, the mouth or aperture of a tube, pipe, or other cavity.

ORIGANUM, *ORIGANY*, or *Marjoram*; a genus of the gymnospermia order, belonging to the didynamia class of plants. The principal species are, two hardy perennials and an annual for the open ground, and five perennials for the green-house: viz. 1. The vulgare, or wild pot-marjoram; 2. The heracleoticum, or winter sweet-marjoram. These are finely-scented aromatics, excellent for culinary purposes, particularly for broths, soups, &c. they have likewise merit for medical uses, and for giving fra-

grance to ointments; so that the plants are proper both for kitchen and physic gardens, and may also be employed in the pleasure-ground as plants of variety. 3. The marjorana, or annual sweet marjoram, is an aromatic of the highest fragrance, is admirable for kitchen use, and excellent for nosegays; it is proper both for the kitchen and pleasure garden, but more particularly the former. It is often called *knotted marjoram*, from the flowers growing in close knotted-like heads. The following mostly assume an undershrubby growth; frequently with abiding stalks, if they have shelter here in winter. 4. The dittamnus, or dittany of Crete; 5. The sipyleum, or origanum of mount Sipylus; 6. The creticum, or Cretan origany; 7. The smyrnæum, or Smyrna origany; 8. The Ægyptiacum, or Egyptian origany. All these eight species of origanum flower in July and August; the flowers are small, monopetalous, ringent, universally hermaphrodite, and collected into verticilli round the stalks; succeeded by ripe seed in autumn; though in this country the annual marjoram and the three green-house sorts seldom perfect seed well, unless the autumn proves remarkably fine and warm: in default, however, of seed, the propagation of all the perennial sorts, both hardy and green-house kinds, is easily effected by slips of the roots, &c. And the seed of the annual sort is imported plentifully from France or Italy, by the seed-dealers.

ORIENT, a harbour of France, in the province of Bretagne, in the bottom of the bay of St Lewis. Since the year 1720, a handsome town has been built here, where the East India company have large magazines. The English attempted to become masters of it in 1746, but miscarried. W. Long. 3. 22. N. Lat. 47. 45.

ORIGEN, one of the most celebrated ecclesiastical writers, greatest geniuses, and most learned men of the primitive church, during the third century, was born at Alexandria, in the year 185; and was surnamed *Adamantus*, either from his indefatigable application to study, or the firmness he discovered amidst the torments he suffered for the faith. Leonides his father educated him with care, and made him apply to the study of the Holy Scriptures from his infancy, in which he made surprising progress. He had afterwards St. Clement of Alexandria for his master in divinity, and at 18 years of age succeeded that great man in the office of catechist, an important employment, which consisted in teaching divinity, and expounding the Scriptures. Leonides his father had suffered martyrdom the year before, during the persecution of Severus in 202; and Origen had shewn such eagerness to follow his father to martyrdom, that his mother was obliged to hide his cloaths, to prevent his going abroad. Origen had a great concourse of auditors who attended his school, some of whom were of the faithful, and the others pagans. He confirmed and strengthened the first in their faith, and converted most of the others; and there were such a number of martyrs amongst his disciples, that it might be said, that he kept rather a school of martyrdom than of divinity. He taught the doctrines of Christianity to the girls and women as well as to the men; and, taking in a too literal sense what Christ says of becoming voluntary eunuchs, castrated himself, to prevent his de-

serving

Origen. serving or suffering scandal. He took a voyage to Rome in 214; and at his return published many works, by which he acquired an extraordinary reputation, that drew to him a great number of auditors. But Demetrius, bishop of Alexandria, conceiving a jealousy of him, endeavoured by various pretences to injure him. At length Origen went to Antioch, whither the empress Mammea had sent for him to hear him discourse on the Christian religion; he did not however stay long there, but returned to Alexandria, where he continued to teach till the year 288, when he left that city, and travelled into Achaia. In that journey he went into Palestine, and was ordained by the bishops of that province at 42 years of age. His being ordained by foreign bishops without the permission of Demetrius, renewed that prelate's resentment against him; on which Origen hastily returned to Alexandria, to endeavour to mollify him; but Demetrius drove him from thence in 231, and caused him to be excommunicated, and even deposed in a council held in Egypt. Origen then retired to Cæsaria in Palestine, where he raised a celebrated school, and had St Gregory Thaumaturgus, and a great number of other persons who were illustrious for their virtue and learning, for his disciples. He afterwards travelled to Athens; and then, at the desire of Firmilianus, staid sometime at Cæsaria in Cappadocia; whence he was invited into Arabia, to convince and bring back to the truth Beryllus, bishop of Bostra, who maintained that the Word had no existence before his incarnation. Origen had the happiness to make him sensible of his mistake; and some years after was sent for into Arabia by an assembly of bishops, to dispute again the Arabians, who maintained that the souls of the dead remained in a state of insensibility till the general resurrection. At length the seventh persecution of the Christians began in the reign of Decius, and none were used with greater severity than Origen. He supported with incredible constancy the dreadful torments which the persecutors of the Christians invented against them; torments that were the more insupportable, as they were made to continue a long time, and as they took the greatest care to prevent his expiring in the midst of his tortures; but in the midst of the most excruciating torments, he discovered an heroic courage, and suffered nothing to escape him that was unworthy a disciple of Jesus Christ. He died at Tyre in 254, aged 69. He was the author of a great number of excellent works. The principal of those which have been handed down to us are, 1. A Treatise against Celsus, of which Spencer has given a good edition in Greek and Latin, with notes: this learned treatise has been translated into French by Elias Bouthereau, a protestant minister, born at Rochelle. 2. A great number of Homilies, with Commentaries on the Holy Scriptures. 3. *Philocalia*, and several other treatises. 4. Fragments of his Hexaples, collected by father Montfaucon, in two volumes folio. Of all Origen's books, the loss of the Hexaples is most to be regretted. This work was thus named from its containing six columns; in the first of which was the Hebrew text of the Bible; in the second, the same text in Greek characters; in the third, the Greek version of the Septuagint; in the fourth, that of Aquila; in the fifth, that of Symmachus; and in the

sixth, Theodotian's Greek version. This admirable work gave the first hint for our Polyglot Bibles. 5. The book of Principles; of which we have only an incorrect Latin version. In all his writings he discovers, a surprising degree of modesty, candour, and humility; a noble and sublime genius, profound learning, and vast erudition. His manners were extremely pure, and he had a warm zeal for spreading the truths and morals of the gospel. The most complete edition of his works is that of father dela Rue, a Benedictine, in Greek and Latin.

He ought not to be confounded with another Origen, a Platonic philosopher, and the disciple and friend of Porphyry, who studied philosophy under Ammonius.

ORIGENISTS, in church-history, a Christian sect in the fourth century, so called from their drawing their opinions from the writings of Origen. The Origenists maintained, that the souls of men had a pre-existent state; that they were holy intelligences, and had sinned in heaven before the body was created; that Christ is only the son of God by adoption; that he has been successively united with all the angelical natures, and has been a cherub, a seraph, and all the celestial virtues one after another; that, in future ages, he will be crucified for the salvation of the devils, as he has already been for that of men; and that their punishment, and that of the damned, will continue only for a certain limited time.

ORIGINAL, a first draught or design of any thing, which serves as a model to be imitated or copied.

ORIGINAL Sin, the crime of eating the forbidden fruit, of which, it is said, all mankind are guilty at their conception, by the imputation of Adam's transgression; which is accounted for by supposing, that Adam, as he was to be the father, was also the federal head and representative, of the whole human human race: and that, on his sinning, all that were to spring from him partook of his crimes.

ORIGUELA, a town of Spain in Valencia. It is seated between the mountains on the banks of the river Segura, in a place fortified by nature, and in a fertile plain, abounding in all things, especially corn. It is surrounded with pleasant gardens, and has a university and a bishop's see. It is defended by an old castle; and is the capital of a government independent of Valencia, whose jurisdiction extends thirty miles in length, and fifteen in breadth. W. Long. o. 56. N. Lat. 38. 22.

ORILLON, in fortification, is a small rounding of earth, faced with a wall; raised on the shoulder of those bastions that have casemates, to cover the cannon in the retired flank, and prevent their being dismounted by the enemy. See FORTIFICATION.

ORIOLUS, in ornithology, a genus belonging to the order of piece. The bill is conical, convex, very sharp and straight; the superior mandible being much longer than the under one; and the tongue is forked and sharp. There are 20 species, principally distinguished by their colour.

ORION, in fabulous history, was the son of Jupiter, Neptune, and Mercury. For as these gods were visiting the earth, they entered the house of Hyrieus, a native of Tanagra, in Boeotia, under the character of benighted travellers, on account of his being famed for

Origenist
Orion.

for hospitality to strangers. Hyrieus treated them in the best manner in his power; and even killed an ox, the only one he had, for their entertainment. At which the gods were so pleased, that they offered the old man whatever he would ask; who letting them know that he desired nothing so much as a son, they, to gratify his wish, caused the ox's hide to be brought before them, in which, having deposited their urine, they bad him keep it under ground for ten months. At the expiration of that term he dug it up, and found in it an infant, whom he at first called *Orion*, to express his origin; but afterwards changed it to *Orion*. He was a remarkable hunter: and Neptune gave him the power of walking on the surface of the waters, with the same speed that *Iphiclus* did over the ears of corn; on which he crossed from the continent of Greece to the island of Chios, where attempting to violate *Ærope*, the wife of king *Oenopion*, that monarch deprived him of his sight. He then travelled to *Lebos*, where he was kindly received by *Vulcan*, who gave him a guide to the palace of the sun, where he was restored to sight. He then made war on *Oenopion*; who escaping his vengeance by concealing himself under ground, he went to *Crete*, where he pursued his favourite exercise of hunting. But having offended *Diana*, that goddess put him to death, either by her arrows, or by sending a scorpion which gave him a mortal wound; but afterwards relenting, she prevailed on *Jupiter* to raise him to the skies, where he forms a constellation, remarkable for predicting rain and tempestuous weather.

ORION, in astronomy, one of the constellations of the southern hemisphere.—The word is formed from the Greek *ὄρεον*, “to make water;” the ancients supposing that it raised tempests at its rising and setting.—The stars in the constellation *Orion*, in Ptolemy's catalogue are 37, in Tycho's 62, in the *Britannic catalogue* 80.

ORISTAGNI, an ancient town of the island of *Sardinia*, with an archbishop's see. It is pretty large and well fortified; but thinly inhabited, on account of the unhealthy air: it is seated on the western coast, in a bay of the same name, in *E. Long.* 8. 58. *N. Lat.* 39. 55.

ORIXA, a kingdom of *Indostan*, lying on the gulf of *Bengal*. It is divided from the ancient kingdom of *Golconda*, by a ridge of mountains, the end of which runs a little way into the sea. It is fertile in corn and cattle, and they have several good towns and harbours on the coast; there are also manufactures of different kinds carried on throughout the kingdom. The prince is a *Gentoo*, who pays to the Great *Mogul* a tribute to the amount of about 12,000*l.* yearly.

ORKNEY ISLANDS, certain islands on the north of *Scotland*, from which they are separated by a strith 20 miles in length and 10 in breadth. They are 40 in number; but many are uninhabited, the greater part being small, and producing only pasture for cattle. The principal islands are denominated by the names of *Mainland*, *South Ronaldsha*, *Swinna*, *Flotta*, *Copinsha*, *Strupensha*, *Stronsa*, *Sanda*, &c. the terminations in *a*, or *ha*, being generally given in the Teutonic to such places as are surrounded by water. The currents and tides flowing between the islands are extremely rapid and dangerous. Near an island call-

ed *Swinna* are two great whirlpools, called the *swells of Swinna*, which are counted dangerous by mariners, especially in a calm. When sailors find themselves sucked into the vortex, it is said they throw out a barrel, or some bulky substance, which smooths the water till it is sucked down and thrown up at a considerable distance, during which time the ship passes over in safety. But when there is a breeze of wind, these whirlpools may be crossed without any danger.

The air of these islands is moist, on account of the neighbourhood of the sea; and frost and snow do not continue long. In some places the soil is bare and mountainous, and in others sandy and barren; however, many of the islands produce large crops of barley and oats, but no wheat or other grain excepting what is inclosed in gardens. These, when duly cultivated, produce all kinds of kitchen herbs and roots, bringing even fruit-trees to maturity; but out of them, in the open country, there is scarce a tree or shrub to be seen, except juniper, wild myrtle, heath, and the *cyur-hodon*: yet this deficiency cannot be imputed to the poverty of the soil, or the nature of the climate; for the trunks of large oaks are frequently dug up in the marshes. This is likewise the case in the most barren parts of the Highlands of *Scotland*, where not a shrub is to be seen above the surface of the earth: nay, the inhabitants frequently find, deep in the earth, the roots of large trees, evidently exhibiting marks of the ax by which they were felled; so that these northern parts must have undergone some strange revolutions. The *Orkneys* produce great variety of herbs and berries, grass and corn, which last is exported as far as *Edinburgh*. In some of the islands, the natives have discovered mines of tin, lead, and silver, though none of them are wrought to any advantage; in others, we find abundance of marl, grey and red slate, quarries of freestone, and even of marble and alabaster: when the wind rages to any violence, the sea throws in plenty of timber, torn from other countries; and, not unfrequently, the people find large pieces of ambergrease. The fresh water in these islands is very pure and limpid; and, though there are no large rivers in the *Orkneys*, the ground is well watered with lakes and pleasant rivulets, that not only serve to turn their mills, but also abound with trout of the most delicate flavour.

Besides the abundance of little horses, black cattle, sheep, swine, and rabbits, the inhabitants of the *Orkneys* rear all sorts of domestic animals and tame poultry. Their heaths and commons yield plenty of red deer, and all sorts of game; partridges, grouse, heath-cocks, plover, duck, teal, and widgeon: the sea-coast teems with seals and otters; and are visited by whales, cod, ling, tusk, herrings, and all manner of fish: on the shore they find *sperma ceti*, or *sepia*, and a great variety of shells and corallines, with a multitude of oysters, remarkably large muscles, crabs, and cockles. The rocks are covered with sea-fowl, wild geese, solan geese, barnacles, eagles, hawks, and kites. With respect to the barnacles, or, as the natives call them, the *clock geese*, they are said to be found in shells sticking by the bills to trees, in several islands. *Martin* affirms he has seen them in this situation, but could not perceive them alive; and indeed

Orkney. the whole account of their generation and production, exhibited by the northern naturalists, is absurd and unphilosophical. The Orkney eagles are so strong, that, according to the reports of the country, they have been known to carry away young children in their talons. Certain it is, they make such havoc among the lambs, that he who kills an eagle is entitled by law to a hen from every house in the parish where it was killed. The king's falconer visits these islands every year, in order to fetch away the young hawks and falcons from their nests among the precipices: he enjoys a yearly salary of twenty pounds, and may claim a hen or a dog, from every house in the country, except those that are expressly exempted from this imposition.

The Orkneys, as well as the hills of Shetland, were originally peopled from Norway, in the ninth, tenth, or eleventh century; and the commonality still retain the language of that kingdom, distinguished by the name of *Norns*: they likewise preserve some customs of these Norwegian ancestors. The islands of Orkney have been at different times subdued by the Scots, and recovered by the Norwegians: at length they were sold by Magnus, king of Norway, to Alexander of Scotland, for the sum of 4000 merks Sterling, and a yearly acknowledgement of 100 merks. Since that period, the Orkneys have continued annexed to the crown of Scotland. The gentry of the Orkneys are civilized, polite, and hospitable; and live like those of Scotland, from whom they are chiefly descended. They live comfortably, are remarkably courteous to strangers, and drink a great quantity of wine, with which their cellars are generally well stored. Indeed the inhabitants of the Orkneys may be now justly deemed a Scotch colony. They speak the language, profess the religion, follow the fashions, and are subject to the laws, of that people. They are frugal, sagacious, circumspect, religious, and hospitable. Their mariners are remarkably bold, active, dexterous, and hardy. Many surprising instances of longevity occur here, as well as in Shetland, of persons living to the age of 140. The Orkney women are generally handsome and well-shaped, and bring forth children at a very advanced age. In the Orkneys, some particular lands are held by a tenure called *Udal Right*, from *Ulcus*, or *Olaus*, king of Norway, who farmed the lands, on condition of receiving one-third of the produce; and this right devolved in succession, without any charter granted by the sovereign. The inhabitants of Orkney, instead of measuring their corn, weigh it in pismores or pun-
dles. Their least denomination is a mark, consisting of 18 ounces, and 24 merks make a lispound, which is a Danish quantity. The poorer sort of people in the Orkneys appear very meanly habited, with a piece of seal-skin instead of shoes; and living chiefly on salt-fish, are subject to the scurvy. They are much addicted to superstitious rites; in particular, interpreting dreams and omens, and believing in the force of idle charms. The islands of Orkney, we have already observed, produce very bold, able, and hardy mariners. The common people, in general, are inured to fatigue, and remarkably adventurous, both in fishing during rough weather, and in climbing the rocks for the fish, eggs, and down of sea-fowl. Former-

ly, while they were exposed to the invasions of the Norwegians, or western islanders, every village was obliged to equip a large boat well manned; and all the fencible men appeared in arms, when the alarm was given by the beacons lighted on the tops of the rocks and highest mountains. These beacons, known by the name of *ward-hills*, are still to be seen in every island. Their corn land they inclose with mud or stone walls, to preserve it from the ravages of their sheep, swine, and cattle, which wander about at random, without being attended by herdsmen: their ordinary manure, especially near the sea-coast, is sea-weed, which they carefully gather and divide into equal portions. Their sheep are marked on the ears and nose; but so wild, that when they have occasion to shear them in the month of May, they are obliged to hunt every individual, with dogs trained for that purpose. Their manner of catching sea-fowl is curious and particular. Under the rock where these fowls build, they row their boat, provided with a large net, to the upper corners of which are fastened two ropes, lowered down from the top of the mountain by men placed in that station. These hoisting up the net, until it be spread opposite to the cliffs in which the fowls are sitting, the boatmen below make a noise with a rattle, by which the fowls, being frightened, fly forwards into the bosom of the net, in which they are immediately enclosed and lowered down into the boat: its owners practise the method used in Iceland and Norway, and are lowered down by a single rope from the summit of the mountain; this is the constant way of robbing the hawk's nest. In these islands some strange effects are produced by thunder and lightning. In the year 1680, the lightning entered a cow-house, in which 12 cows stood in a row, killed every second beast as the flood, and left the rest untouched. The distempers that prevail mostly in the Orkneys are agues, consumptions, scurvy, and itch. The agues, which abound in the spring, the natives cure with a diet-drink of biters and antiscorbutics infused in ale: for phthical complaints they use the plant arby, and the caryophyllus marinus boiled with sweet milk.

The isles of Orkney and Shetland compose one stewartry, and send one member to the British parliament. The right of superiority to the Orkneys was dismembered from the crown by the union parliament, and granted for a certain yearly consideration to the earl of Moreton, by queen Anne, who appointed him hereditary steward and judiciary. This nobleman possesses the power of creating certain judges, called *baillifs*. There is one of these established in every island and parish, with power to superintend the manners of the inhabitants, to hold courts and determine civil causes, according to the laws of Scotland, to the value of ten pounds Scotch money, amounting to 16s. 8d: but all contests of higher import are referred to the decision of the steward or his deputy, who resides at Kirkwall, which is the seat of justice. Subservient to the baillifs are six or seven of the most reputable and intelligent inhabitants, who oversee the conduct of their fellows, acting as constables, and make report of all enormities to the bailliff; who causes the delinquent to be apprehended and punished, if the crime be within the extent of his judicial power; otherwise he transmits him to Kirkwall, where he is tried
by

Orkney. by the steward. The Protestant religion prevails in the isles of Orkney, according to the rites and discipline of the kirk, these, and the isles of Shetland, constituting one presbytery, which assembles at Kirkwall. The country is divided into 18 parishes, containing 31 churches, and above 100 chapels.

The trade of the Orkneys is not at present very considerable, though it might be extended to great advantage. They supply with fresh provisions, for ready money, the ships and vessels that touch upon the coast in the course of northern voyages, or in their passage from the East Indies, when they go north about Ireland and Scotland, in time of war, to avoid the privateers of the enemy. They are also visited by those engaged in the herring-fishery, though there is not such a resort on this account to these islands as to the isles of Shetland. Nevertheless, a good number of boats from the western parts of Scotland, as well as from Londonderry, Belfast, and other parts of Ireland, fish for herring as far north as the Leuze, and supply the Orkneys with tobacco, wine, brandy, and other spirituous liquors, cloths, and divers manufactures. These they exchange for fish, and oil extracted from porpoises, seals, and other sea-animals. The people of Orkney export annually great numbers of black cattle, swine, and sheep; together with large quantities of corn, butter, tallow, salt, and fluffs made in the country, over and above the skins of seals, otters, lambs, and rabbits, down, feathers, writing-quills, hams, and wool: yet all these articles would, in point of profit, fall infinitely short of their herring-fishery, were it prosecuted with industry, economy, and vigour. As there are no merchants in the Orkneys at present who export fish on their own account, what herrings are taken, they sell to the Dutch or Scotch dealers in and about Inverness. They generally fish for herring on the west side of the Orkneys; and are therefore more remote from markets, than those who are employed in the same manner on the coast of Shetland.

We may reckon among the curiosities of the Orkneys, the *Phaeelli*, commonly known by the name of *Molucca beans*, which are thrown upon the shore after storms of westerly winds, and are supposed to be driven thus far north from the West-Indies, where they grow. Many strange fishes and curious shells are also frequently cast up by the ocean; of these last a vast variety for adorning the cabinets of modern naturalists. Sometimes exotic fowls are driven upon the Orkneys by tempestuous weather: fish, as large as whittings, have been thrown ashore to a considerable distance within the land. At Cantick-head, in the island Waes, and some other places, huge stones are often heaved up by the violence of the sea and wind, and cast over high rocks upon the land. A single Laplander has been seen more than once on this coast, in his slender canoe, covered with skins, being driven hither by adverse winds and storms. The Orkneys are not altogether destitute of ancient monuments and curiosities of art. In Hoy we find an entire lone, 36 feet long, 18 in breadth, and 9 in thickness, lying between two hills, and known by the name of *dwarfie lone*. It is hollowed within by the tools of a mason, the marks of which are still apparent. The entrance is a square hole about two feet high, with a stone, by way of door,

standing before it. Within we find a bed with a pillow cut of the stone; at the other end is a couch of the same kind; and in the middle a hearth, above which there is a hole or vent for the exit of the smoke. This curiosity is found in the midst of a desolate heath, and is supposed to have been the residence of a hermit: in the very neighbourhood of this lone there is a very high and steep mountain, called the *nuart hill of Hoy*, near the summit of which, in the months of May, June, and July, something at noon-day is seen to shine and sparkle with remarkable lustre, supposed by the common people to be an enchanted carbuncle: many persons have clambered up the hill in quest of it, but found nothing. Perhaps this splendour is produced by the reflection of the sun on a small stream of water sliding over the face of a smooth rock. At Stennis, in the main land, there is a causeway of stones over a loch or lake, at the south end of which we observe a circle of stones rising about 20 feet above ground, each being six feet in breadth, and from one to two feet in thickness: between this circle and the causeway two stones of the same dimensions stand by themselves, and one of them is perforated in the middle. At the distance of half a mile from the other end of the causeway appears a larger circle of the same kind of stones, the diameter of which may amount to 110 paces; some of these stones are fallen; and to the east and west of the larger circle are two artificial green mounts. Both rounds are surrounded with a ditch; and one cannot view them without admiration, considering the art that must have been used to bring such unwieldy masses together in this order. They were probably temples and places of sacrifice used in times of pagan superstition; and seem to bear a great affinity with the celebrated monument, called *Stonehenge*, on Salisbury Plain in England. In one of the mounts, at the north end of the causeway, the natives found nine *fibulae*, or clasps of silver, formed into a circle, and resembling a horse-shoe. In many different places of the Orkneys we find rude obelisks or single stones of a great height, set up either as memorials of battles, treaties, or the decease of remarkable personages. In Rousay, between two high mountains, there is a place which the natives distinguish by the appellation of the *camp of Jupiter Fring*: but the meaning of this name, handed down by tradition, is not known. At the west end of the main land, near Skeal, we find a surprising causeway, above a quarter of a mile in length, on the summit of high hills, composed of reddish stones of different magnitude, impressed with various figures both on the upper and under surface. Some gentlemen in the neighbourhood have carried off the most beautiful of these stones, to be set in their chimnies by way of ornament, like the painted tiles of Holland. This country produces many sepulchres of different nations. In the plains or links of Skeal, the sand being blown away from the surface of the ground, several square catacombs appear built of stones well cemented together, containing some parcels of black earth, and each secured by a large stone at the mouth. Sepulchres of the same kind are found at Rousum in Stronsay; which is likewise remarkable for a different kind of monument, consisting of one entire stone cylinder hollowed, with a bottom like that of a barrel, and a round

Orkney
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Orleanois.

stone to fill up the entrance; above, the stone was sharpened into an edge; within were found some burned bones and red clay; and over it was placed a large flat stone for the preservation of the whole. Thence, in all probability were Roman catacombs. In Westra divers Danish graves have been discovered: in one of these appeared the skeleton of a man, with a sword on one side, and a Danish ax on the other. Some have been found buried with dogs, combs, knives, and other utensils. In many places of the country we find round hillocks or barrows, here known by the name of *brogh*, signifying, in the Teutonic language, burying-place, supposed to have been the cemeteries of the ancient Saxons. In different parts of these islands we see the remains of great buildings, believed to have been fortresses erected by the Danes or Norwegians when they possessed the country. One of these in the isle of Wyre, called the *castle of Coppi-row*, signifying a town of security, is surrounded by a fosse, and the first floor still remains above ground, a perfect square of stone wall, very thick, strongly built, and cemented with lime, the area within not exceeding ten feet in length. Of this Coppi-row the common people relate many idle fables. In the chapel of Clet, in the isle of Sanda, there is a grave 19 feet long, in which was found part of a man's back bone, larger than that of a horse. Human bones, of nearly the same size, have been dug up in Westra; and indeed this country is remarkable for producing men of a gigantic stature. Within the ancient fabric of Lady Kirk in South Ronaldshaw, there is a stone four feet long, and two feet broad, on which the print of two feet are engraven, supposed to be the place where, in times of Popery, penitents stood to do public penance.

ORLE, ORLET, or *Orlo*, in architecture, a fillet under the ovolo, or quarter round of a capital. When it is at the top or bottom of a shaft, it is called *cincture*. Palladio uses the word orlo for the plenith of the basis of the columns.

ORLE, in heraldry, an ordinary, in form of a fillet, drawn round the shield, near the edge or extremity thereof, leaving the field vacant in the middle. Its breadth is but half that of the tressure or bordure, which contains a sixth part of the shield; and the orle only a twelfth: besides, that the orle is its own breadth distant from the edge of the shield, whereas the bordure comes the edge itself. The form of the orle is the same with that of the shield, whence it resembles an escutcheon. See Plate CXLIV. fig. 1. (A.)

ORLEANOIS, a province of France, including the several districts of Orleanois-Propre, Beauce-Propre or Chartrain, Dunois, Vendomois, Blaisois, the greatest part of Gatinois, and Perche-Gouet. The principal rivers of it are the Loire, the Loiret, the Cher, the Laconie, the Aigle, the Hyere, the Yonne, and the Evre. There are also some remarkable canals, particularly those of Briare and Orleans. The river Loire, and the canals drawn from thence, greatly facilitate and promote the inland trade of the kingdom; and particularly of this government, which lies entirely within the jurisdiction of the parliament of Paris; and, besides the chief governor, has several subordinate ones.

Orleanois, in Latin *Aurelianensis Ager*, is bounded

on the south by Sologne, on the north by Upper-Beauce, on the east by Gatinois, and on the west by Dunois and Vendomois. The Loire divides it into Upper and Lower; the former lying to the north, and the latter to the south of that river. It yields plenty of grain, wine, wood, and fruit, and abounds in cattle, game, and fish. The principal places in it are,

Orleans, from which it derives its name, and is the capital, not only of it, but of the whole government. It was anciently called *Genabum* or *Genabum*, and afterwards *Aurelia*, *Aurelius*, and *Aurelianum*; and stands 20 leagues from Paris to the south, on the northern bank of the Loire, over which there is here a fine stone bridge of 16 arches, leading into a suburb on the south side of the river. In Julius Cæsar's time it was the capital of the Carnutes. Aurelian, the emperor, enlarged it, and gave it his name. It is one of the largest cities in the king; but meanly built, and most of the inhabitants are poor; though there are here several inferior courts of justice, with an university, at present in no great repute; a public library; a lately Gothic cathedral, and a great number of other churches, some of which are collegiate; a public walk, planted with several rows of trees; some sugar-bakers; a manufacture of stockings and sheep-skins; a seminary, in which divinity is taught; and a great trade in brandy, wine, spices, and several manufactures, which, with many other commodities, are conveyed from hence to Paris, and other places, by means of the Loire, and the canal which takes its name from the city. Some of the trading people are very rich. The canal begins about two miles above the city; is near 18 leagues in length; and terminates on the Loing, which falls into the Seine. To the north of the city is a forest, the largest in the whole kingdom, belonging to the duke of Orleans; to whom the timber felled in it brings in, one year with another, about 100,000 livres. Ever since the year 1344, this city has been a dukedom and peerage, and usually an appennage of some prince of the blood. Lewis XIV. gave it to his brother Philip; who begun and finished the canal, in whose family it still continues. The duties paid by vessels going up and down the canal, amount, in some years, to 150,000 livres. The bishop of this city is suffragan to the archbishop of Paris, and has a revenue of 24,000 livres, out of which his tax to Rome is 2000 florins. It is said, a new bishop, on the first day of his entering the city, has the privilege to release all the prisoners in it, except those committed for treason. On the eighth of May, 1429, Orleans, then closely besieged by the English, was relieved by Joan of Arc, commonly called the *Maid of Orleans*; and the anniversary of that deliverance is still kept here. To perpetuate the memory of it, a monument of brass was erected on the bridge, which is still in being.

ORLOPE, in the sea-language, the uppermost space or deck in a great ship, reaching from the main to the mizen-mast. In three-deck ships, the second and lowest decks are sometimes called *orlopes*.

ORMOND, the northern division of the county of Tipperary, in the province of Munster in Ireland. For a long time it gave the title of *earl*, and afterwards of *marquis* and *duke*, to the noble family of Butler, descended from a sister of Thomas à Becket archbishop of Canterbury; till, at the accession of George I. the

Orleanois
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Orm ad.



ORMUS. In that part of the country the family had great prerogatives and privileges granted by Edward III.

ORMUS, an island of Asia, about two leagues from the main land, almost at the mouth of the Persian gulph. It is about six leagues in circuit; but is quite barren, and has not a drop of fresh water. They catch excellent oysters about the island; and it yields plenty of fine white salt; also a kind of shining black sand, which is used for dusting writings, and is transported in considerable quantity to Europe. This island was for some time in possession of the Portuguese, when there was a very rich and populous town upon it, where all the trade of the Indies was managed; but that has long been in ruins, and there is now nothing

inhabited but the fort.

ORNITHOGALLUM, STAR OF BETHLEHEM; a genus of the monogynia order, belonging to the hexandria class of plants. There are seven species; all of them herbaceous perennials, rising from six inches to three feet high, having stalks terminated with long spikes of hexapetalous, star-shaped, white and yellow flowers. Six of the species are very hardy, and will prosper in any situation; but one, named the *capense*, a native of the Cape of Good Hope, requires the assistance of artificial warmth to preserve it in this country. They are all easily propagated by off-sets from the roots. The bulbous roots of all the species are nutritious and wholesome.

Ornithogallum.

O R N I T H O L O G Y.

ORNITHOLOGY is a science which treats of birds; describes their form, external and internal; and teaches their œconomy and their uses. See BIRD.

A bird is an animal covered with feathers; furnished with a bill; having two wings, and only two legs; with the faculty, except in a very few instances, of removing itself from place to place through the air.—But before proceeding to analyse the characteristic parts of birds, it will be proper to premise an explanation of the terms used by naturalists in describing them.

EXPLANATION of some Technical Terms in Ornithology used by PENNANT and LINNÆUS.

Fig.

1. *Cere. Cera* THE naked skin that covers the base of the bill in the hawk kind.
2. *Capistrum* A word used by Linnæus to express the short feathers on the forehead just above the bill. In crows these fall forwards over the nostrils.
3. *Lorum* The space between the bill and the eye, generally covered with feathers; but in some birds naked, as in the black and white grebe.^v
4. *Orbits. Orbita* The skin that furrounds the eye, which is generally bare; particularly in the heron and parrot.
5. *Emarginatum* A bill is called *rostrum emarginatum* when there is a small notch near the end: this is conspicuous in that of butcher-birds and thrushes.
6. *Vibrissæ* *Vibrissæ pectinatae*, stiff hairs that grow on each side the mouth, formed like a double comb, to be seen in the goat-sucker, fly-catcher, &c.
7. *Basilar wing Alula spuria* A small joint rising at the end of the middle part of the wing, or the *cubitus*; on which

8. *Lesser coverts of the wings* *Tectrices primæ* are three or five feathers. The small feathers that lie in several rows on the bones of the wings. The under coverts are those that line the inside of the wings.
9. *Greater coverts* *Tectrices secundæ* The feathers that lie immediately over the quill-feathers and secondary feathers.
10. *Quill-feathers* *Primores* The largest feathers of the wings, or those that rise from the first bone.
11. *Secondary feathers* *Secundariæ* Those that rise from the second.
12. *Coverts of the tail* *Uropygium* Those that cover the base of the tail.
13. *Vent-feathers* Those that lie from the vent to the tail. *Criſsum Linnæi*.
14. *The tail. Rectrices*
15. *Scapular feathers* That rise from the shoulders, and cover the sides of the back.
16. *Nucha* The hind part of the head.
17. *Rostrum subulatum* A term Linnæus uses for a straight and slender bill.
18. To shew the structure of the feet of the kingfisher.
19. *Pes scanforius* The foot of the woodpecker formed for climbing. Climbing feet.
20. *Finned foot. Pes lobatus, pinnatus* Such as those of the grebes, &c. Such as are indented, as fig. 21. are called *scalloped*, such are those of coots and scalloped sandpipers.
22. *Pes tridactylus* Such as want the back toe.
23. *Semi-palmated. Pes semi-palmatus* When the webs only reach half way of the toes.
24. *Ungue postico sessili* When the hind-claw adheres to the leg without any toe, as in the petrels.
25. *Digitis 4 omnibus palmatis* All the four toes connected by webs, as in the corvorants.
- Rostrum cultratum* When the edges of the bill are very sharp, such as in that of the crow.

Unguiculatum

*Lingua ciliata**Integra**Lunibriciformis**Pedes compedes**Nares Lineares**Marginatae*

A bill with a nail at the end, as in those of the goofanders and ducks.

When the tongue is edged with fine bristles, as in ducks.

When plain or even.

When the tongue is long, round, and slender like a worm, as that of the woodpecker.

When the legs are placed so far behind as to make the bird walk with difficulty, or as if in fetters; as is the case with the auks, grebes, and divers.

When the nostrils are very narrow; as in sea gulls.

With a rim round the nostrils, as in the flares.

SECT. I. External parts of Birds.

A BIRD may be divided into *head, body, and limbs.*

I. HEAD.

1. BILL (*rostrum*), is a hard horny substance, consisting of an upper and under part, extending from the head, and answering to the mandibles in quadrupeds. Its edges generally plain and sharp, like the edge of a knife, *cultrated*, as are the bills of crows; but sometimes *serrated*, as in the toucan; or *jagged*, as in the gannet and some herons; or *pellinated*, as in the duck; or *denticulated*, as in the mergansers; but always destitute of real teeth immersed in sockets.

The base in falcons is covered with a naked skin or cere (*cera*); in some birds with a caraneous appendage, as the turkey; or a callous, as the curassow.

In birds of prey, the bill is hooked at the end, and fit for tearing: in crows, straight and strong for picking: in water-fowl, either long and pointed, for striking; or slender and blunt, for searching in the mire; or flat and broad, for gobbling. Its other uses are for building nests; feeding the young; climbing, as in parrots; or, lastly, as an instrument of defence, or offence.

2. NOSTRILS, (*nares*), the nice instruments of discerning their food, are placed either in the middle of the upper mandible, or near the base, or at the base, as in parrots; or behind the base, as in toucans and hornbills: but some birds, as the gannet, are destitute of nostrils. The nostrils are generally naked; but sometimes covered with bristles reflected over them, as in crows, or hid in the feathers, as in parrots, &c.

The fore-part of the head is called the *front* (*capistrum*); the summit (*vertex*), or the *crown*: the hind part, with the next joint of the neck (*nucha*), the *nape*: the space between the bill and the eyes, which in herons, grebes, &c. is naked, (*lora*), the *straps*: the space beneath the eyes (*genae*), the *cheeks*.

3. OMBITS, (*orbites*), the eye-lids; in some birds naked, in others covered with short soft feathers.

Birds have no eye-brows; but the grouse kind have in lieu, a scarlet naked skin above, which are called *supercilia*; the same word is also applied to any line of a different colour that passes from the bill over the eyes.

4. EARS. Birds are destitute of auricles or exter-

nal ears, having an orifice for admission of sound; open in all but owls, whose ears are furnished with valves.

5. The CHIN, the space between the parts of the lower mandible and the neck, is generally covered with feathers; but, in the cock and some others, have caraneous appendages called *wattles* (*palearia*); in others, is naked, and furnished with a pouch, capable of great dilatation (*jaculular*), as in the pelican and corvorants.

6. NECK, (*collum*), the part that connects the head to the body, is longer in birds than any other animals; and longer in such as have long legs than those that have short, either for gathering up their meat from the ground, or striking their prey in the water, except in web-footed fowl, which are, by reverting their bodies, declined to search for food at the bottom of waters, as swans, and the like. Birds, especially those that have a long neck, have the power of retracting, bending, or stretching it out, in order to change their centre of gravity from their legs to their wings.

II. BODY.

1. Consists of the BACK, (*dorsum*); which is flat, straight, and inclines; terminated by the

2. RUMP, (*uropygium*), furnished with two glands, secreting a fattish liquor from an orifice each has, which the birds express with their bills to oil or anoint the discomposed parts of their feathers. These glands are particularly large in molt web-footed water-fowl; but in the grebes, which want tails, they are smaller.

2. BREAST, (*pectus*), is rigid and very muscular, defended by a forked bone, (*clavicula*), the merrythought.

The short-winged birds, such as grouse, &c. have their breasts most fleshy or muscular; as they require greater powers in flying than the long-winged birds, such as gulls, herons, which are specifically lighter, and have greater extent of sail.

4. BELLY, (*abdomen*), is covered with a strong skin, and contains the entrails.

5. THE VENT, or vent-feathers, (*crissum*), which lies between the thighs and the tail. The anus lies hid in those feathers.

III. LIMBS.

1. WINGS, (*ale*), adapted for flight in all birds except the dodo, ostriches, great auk, and the penguins, whose wings are too short for the use of flying; but in the dodo and ostrich, when extended, serve to accelerate their motion in running; and in the penguins perform the office of fins, in swimming or diving.

The wings have near their end an appendage covered with four or five feathers called the *bastard wing*, (*ala notha*), and *alula spuria*.

The lesser coverts (*teltrices*), are the feathers which lie on the bones of the wings.

The greater coverts are those which lie beneath the former, and cover the quill-feathers and the secondaries.

The quill-feathers (*primores*), spring from the first bones (*digiti* and *metacarpi*) of the wings, and are 10 in number.

Quill-feathers are broader on their inner than exterior sides.

The secondaries (*secundarie*), are those that rise from the second part (*cubitus*), and are about 18 in number,

number, are equally broad on both sides. The primary and secondary wing-feathers are called *remiges*.

A tuft of feathers placed beyond the secondaries near the junction of the wings with the body. This, in water-fowl, is generally longer than the secondaries, and cuneiform.

The scapulars are a tuft of long feathers arising near the junction of the wings (*brachia*) with the body, and lie along the sides of the back, but may be easily distinguished, and raised with one's finger.

The inner coverts are those that clothe the under side of the wing.

The subaxillary are peculiar to the greater Paradise.

The wings of some birds are instruments of offence. The anhimas of Maracay have two strong spines in the front of each wing. A species of plover, *Edw. tab. 47.* and 280. has a single one on each; the whole tribe of jacana, and the gambo, or four-winged goose of Mr Willoughby, the same.

2. The **TAIL** is the director, or rudder, of birds in their flight; they rise, sink, or turn by its means; for, when the head points one way, the tail inclines to the other side: it is, besides, an equilibrium or counterpoise to the other parts; the use is very evident in the kite and swallows.

The tail consists of strong feathers (*rectrices*), 10 in number, as in the woodpeckers, &c.; 12 in the hawk tribe, and many others; in the gallinaceous, the mergansers, and the duck kind, of more.

It is either even at the end, as in most birds; or forked, as in swallows; or cuneated, as in magpies, &c.; or rounded, as in the purple jacksaw of Catsby. The grebe is destitute of a tail, the rump being covered with down; and that of the cassowary with the feathers of the back.

Immediately over the tail, are certain feathers that spring from the lower part of the back, and are called the *coverts of the tail*, (*uropygium*).

3. **THIGHS**, (*femora*), are covered entirely with feathers in all land-birds, except the bustards and the ostriches; the lower part of those of all waders, or cloven-footed water-fowl, are naked; that of all webbed-footed fowl the same, but in a less degree; in rapacious birds, are very muscular.

4. **LEGS**, (*crura*); those of rapacious fowls very strong, furnished with large tendons, and fitted for tearing and a firm gripe. The legs of some of this genus are covered with feathers down to the toes, such as the golden eagle; others to the very nails; but those of most other birds are covered with scales, or with a skin divided into segments, or continuous. In some of the pies, and in all the passerine tribe, the skin is thin and membranous; in those of web-footed water-fowl, strong.

The legs of most birds are placed near the centre of gravity: in land-birds, or in waders that want the back toe, exactly so; for they want that appendage to keep them erect. Auks, grebes, divers, and penguins, have their legs placed quite behind, so are necessitated to sit erect: their pace is awkward and difficult, walking like men in fetters: hence Linnaeus styles their feet *pedes compedes*.

The legs of all cloven-footed water-fowl are long, as they must wade in search of food: of the palmated, short, except those of the flamingo, the avocet, and the

courier.

5. **FEET**, (*pedes*), in all land-birds that perch, have a large back toe: most of them have three toes forward, and one backward. Woodpeckers, parrots, and other birds that climb much, have two forward, two backward; but parrots have the power of bringing one of their hind toes forward while they are feeding themselves. Owls have also the power of turning one of their fore toes backward. All the toes of the *swift* turn forwards, which is peculiar among land-birds: the tridactylous woodpecker is also anomalous, having only two toes forward, one backward: the ostrich is another, having but two toes.

6. **TOES**, (*digiti*). The toes of all waders are divided; but, between the exterior and middle toe, is generally a small web, reaching as far as the first joint.

The toes of birds that swim are either plain, as in the single instance of the common water-hen or gallinule; or pinnated, as in the coots and grebes; or entirely webbed or palmated, as in all other swimmers.

All the plover tribe, or charadrii, want the back-toe. In the swimmers, the same want prevails among the albatrosses and auks. No water-fowl perch, except certain herons, the corvora, and the flag.

7. **CLAWS**, (*ungues*). Rapacious birds have very strong, hooked, and sharp claws, vultures excepted. Those of all land-birds that roost on trees have also hooked claws, to enable them to perch in safety while asleep.

The gallinaceous tribe have broad concave claws for scraping up the ground.

Grebes have flat nails like the human.

Among water-fowl, only the skua, *Br. Zool. II. p. 417.* 3d edit. n° 234, and the black-toed gull, *Br. Zool. II. p. 419.* 3d edit. n° 435, have strong hooked or aquiline claws. All land-birds perch on trees, except the struthious and some of the gallinaceous tribes. Parrots climb; woodpeckers creep up the bodies and boughs of trees; swallows cling.

All water-fowl rest on the ground, except certain herons, and one species of ibis, the spoonbill, one or two species of ducks and of corvora.

IV. FEATHERS.

FEATHERS are designed for two uses; as coverings from the inclemency of the weather, and instruments of motion through the air. They are placed in such a manner as to fall over one another, (*tegulatum*), so as to permit the wet to run off, and to exclude the cold; and those on the body are placed in a quincunx form; most apparent in the thick-skinned water-fowl, particularly in the divers.

1. The parts of a feather are, the shafts; corneous, strong, light, rounded, and hollow at the lower part; at the upper, convex above, concave beneath, and chiefly composed of a pith.

2. On each side the shafts are the vanes, broad on one side, narrow on the other; each vane consists of a multitude of thin laminae, stiff, and of the nature of a split quill. These laminae are closely braced together by the elegant contrivance of a multitude of small bristles; those on one side hooked, the other straight, which lock into each other, and keep the vanes smooth, compact, and strong.

The vanes near the bottom of the shafts are soft, unconnected,

connected, and downy.

3. Feathers are of three kinds. (1.) Such as compose instruments of flight: as the pen-feathers, or those which form the wings and tail, and have a large shaft. The vanes of the exterior side bending downward, of the interior upwards, lying close on each other, so that, when spread, not a feather misses its impulse on the air. The component parts of these feathers are described before.

(2.) The feathers that cover the body, which may be properly called the *plumage*, have little shaft, and much vane; and never are exerted or relaxed, unless in anger, fright, or illness.

(3.) The Down, (*plumæ*), which is dispersed over the whole body amidst the plumage, is short, soft, unconnected, consists of lanuginous vanes, and is intended for excluding that air or water which may penetrate or escape through the former. This is particularly apparent in aquatic birds, and remarkably so in the anserine tribe. There are exceptions to the forms of feathers. The vanes of the subaxillary feathers of the Paradise are unconnected, and the laminae distant, looking like herring-bone. Those of the tail of the ostrich, and head of a species of curassow, curled. Those of the cassowary consist of two shafts, arising from a common stem at the bottom: as do, at the approach of winter, (after moulting), those of the ptarmigans of arctic countries. The feathers of the penguins, particularly those of the wings, consist chiefly of thin flat shafts, and more resemble scales than feathers; those of the tail, like split whale-bone.

SECT. II. Flight of Birds.

The flight of birds is various; for, had all the same, none could elude that of rapacious birds. Those which are much on wing, or sit from place to place, often owe their preservation to that cause: those in the water, to diving.

Kites, and many of the falcon tribe, glide smoothly through the air, with scarce any apparent motion of the wings.

Most of the order of pies fly quick, with a frequent repetition of the motion of the wings. The Paradise floats on the air. Woodpeckers fly awkwardly, and by jerks, and have a propensity to sink in their progress.

The gallinaceous tribe, in general, fly very strong and swiftly; but their course is seldom long, by reason of the weight of their bodies.

The columbine race is of singular swiftness; witness the flight of the CARRIER-PIGEON.

The passerine fly with a quick repetition of strokes; their flight, except in migration, is seldom distant.

Among them, the swallow tribe is remarkably agile, their evolutions sudden, and their continuance on wing long.

Nature hath denied flight to the struthious; but still, in running, their short wings are of use, when erect, to collect the wind, and like sails to accelerate their motion.

Many of the greater cloven-footed water-fowl, or waders, have a slow and flagging flight; but most of the lesser fly swiftly, and most of them with extended legs, to compensate the shortness of their tails. Rails and gallinules, fly with their legs hanging down.

Coots and grebes, with difficulty are forced from the water; but when they rise, fly swiftly. Grebes, and also divers, fly with their hind parts downwards, by reason of the forwardness of their wings.

Web-footed fowl are various in their flight. Several have a failing or flagging wing, such as gulls. Penguins, and a single auk, are denied the power of flight. Wild geese, in their migrations, do not fly pell-mell, but in a regular figure, in order to cut the air with greater ease; for example, in long lines, in the figure of a >, or some pointed form or letter, as the ancients report that the cranes assumed in their annual migrations, till their order was broken by storms.

*Strymona sic gelidum, bruma pellente, relinquunt,
Polaris te, Nile, Gaues, primoque volatus
Effugunt varias, casu monstrante, figuras.
Mox ubi percussit tentis NOTUS alior alos,
Confusos temere immixte glomerantur in orbes,
Et turbata perit dispersis littera * penari.*

* TAA.

Lucan. lib. v. l. 711.

SECT. III. Of the Nuptials, Nidification, and Eggs of Birds.

1. Most birds are monogamous, or pair; in spring fixing on a mate, and keeping constant till the cares of incubation and educating the young brood is past. This is the case, as far as we know, with all the birds of the first, second, fourth, and fifth orders.

Birds that lose their mates early, associate with others; and birds that lose their first eggs will pair and lay again. The male, as well as the female, of several, join alternately in the trouble of incubation, and always in that of nutrition; when the young are hatched, both are busied in looking out for and bringing food to the nestlings; and, at that period the mates of the melodious tribes, who, before, were perched on some sprig, and by their warbling alleviated the care of the females confined to the nest, now join in the common duty.

Of the gallinaceous tribe, the greatest part are polygamous, at least in a tame state; the pheasant, many of the grouse, the partridges, and bustards, are monogamous; of the grouse, the cock of the wood, and the black game, assemble the females during the season of love, by their cries,

Et venerem incertam rapiunt.

The males of polygamous birds neglect their young; and, in some cases, would destroy them, if they met with them. The œconomy of the struthious order, in this respect, is obscure. It is probable that the three species in the genus ostrich are polygamous, like the common poultry, for they lay many eggs; the dodo is said to lay but one.

All waders or cloven-footed fowl are monogamous; and all with pinnated feet, are also monogamous, except the ruffs.

The swimmers or web-footed fowl observe the same order, as far as can be remarked with any certainty; but many of the auks assemble in the rocks in such numbers, and each individual so contiguous, that it is not possible to determine their method in this article.

It may be remarked, that the affection of birds to their young is very violent during the whole time of nutrition, or as long as they continue in a helpless state; but, so soon as the brood can fly and shift for itself, the parents neglect, and even drive it from their haunts, the

Nidification the affection ceasing with the necessity of it: but, during that period,

The mothers nurse it, and the sires defend.
The young dismils'd, to wander earth, or air,
There stops the infatid, and there ends the care:
The link dissolves; each seeks a fresh embrace;
Another love succeeds, another race.

2. The Nest of a bird is one of those daily miracles that from its familiarity is passed over without regard. We stare with wonder at things that rarely happen, and neglect the daily operations of nature that ought first to excite our admiration and claim our attention.

Each bird, after nuptials, prepares a place suited to its species, for the depositing its eggs and sheltering its little brood: different genera, and different species, set about the task in a manner suitable to their several natures; yet, every individual of the same species collects the very same materials, puts them together in the same form, and chooses the same sort of situation for placing this temporary habitation. The young bird of the last year, which never saw the building of a nest, directed by a heaven-taught sagacity, pursues the same plan in the structure of it, and selects the same materials as its parent did before. Birds of the same species, of different and remote countries, do the same. The swallows of Britain, and of the remoter parts of Germany, observe the same order of architecture.

The nests of the larger rapacious birds are rude, made of sticks and bents, but often lined with something soft; they generally build in high rocks, ruined towers, and in desolate places: enemies to the whole feathered creation, they seem conscious of attacks, and seek solitude. A few build upon the ground.

Shrikes, the least of rapacious birds, build their nests in bushes, with moss, wool, &c.

The order of pies is very irregular in the structure of their nests. Parrots, and in fact all birds with two toes forward and two backward, lay their eggs in the hollows of trees. And most of this order creep along the bodies of trees, and lodge their eggs also within them.

Crows build in trees: among them, the nest of the magpie, composed of rude materials, is made with much art, quite covered with thorns, and only a hole left for admittance.

The nests of the orioles are contrived with wonderful sagacity, and are hung at the end of some bough, or between the forks of extreme branches. In Europe, only three birds have pensile nests; the common oriole, the parus pendulinus, or hang-nest titmouse, and one more. But in the torrid zones, where the birds fear the search of the gliding serpent and inquisitive monkey, the instances are very frequent; a marvellous instinct implanted in them for the preservation of their young.

All of the gallinaceous and struthious orders lay their eggs on the ground. The ostrich is the only exception, among birds, of the want of natural affection: "Which leaveth her eggs in the earth, and warmeth them in the dust, and forgetteth that the foot may crush them, or the wild beast may break them."

The columbine race makes a most artless nest, a few sticks laid across may suffice.

Most of the passerine order build their nests in shrubs or bushes, and some in holes of walls or banks.

Several in the Torrid Zone are pensile from the boughs of high trees; that of the taylor-bird, a wondrous instance†. Some of this order, such as larks,† See Mo- and the goatfucker, on the ground. Some swallows make a curious plaster-nest beneath the roofs of houses; and an Indian species, one of a certain glutinous matter, which are collected as delicate ingredients for soups of Chinese epicures. See the article Birds-Nests.

Most of the cloven-footed water-fowl, or waders, lay upon the ground. Spoonbills and the common heron build in trees, and make up large nests with sticks, &c. Storks build on churches, or the tops of houses.

Coots make a great nest near the water-side.

Grebes, in the water, a floating nest, perhaps adhering to some neighbouring reeds.

Web-footed fowl breed on the ground, as the avo-set, terns, some of the gulls, mergansers, and ducks: the last pull the down from their breasts, to make a softer and warmer bed for their young. Auks and guillemots lay their eggs on the naked shelves of high rocks; pinguins, in holes under ground: among the pelicans, that which gives name to the genus, makes its nest in the desert, on the ground. Shags, sometimes on trees; corvorants and gannets, on high rocks, with sticks, dried algæ, and other coarse materials.

3. Rapacious birds, in general, lay few Eggs; eagles, and the larger kinds, fewer than the lesser. The eggs of falcons and owls are rounder than those of most other birds; they lay more than six.

The order of pies vary greatly in the number of their eggs.

Parrots lay only two or three white eggs.

Crows lay six eggs, greenish, mottled with dusky.

Cuckoos, as far as we can learn, two.

Woodpeckers, wryneck, and kingsfisher, lay eggs of a clear white and semi-transparent colour. The woodpeckers lay six, the others more.

The nuthatch lays often in the year, eight at a time, white, spotted with brown.

The hoopoe lays but two cinerous eggs.

The creeper lays a great number of eggs.

The honeycreeper, the least and most defenceless of birds, lays but two: but Providence wisely prevents the extinction of the genus, by a swiftness of flight that eludes every pursuit.

The gallinaceous order, the most useful of any to mankind, lay the most eggs, from 8 to 20. *Benigna circa hoc natura, innocua et esculenta animalia fecunda generavit*, is a fine observation of Pliny. With exception to the bustard, a bird that hangs between the gallinaceous and the waders, which lays only two.

The columbine order lays but two white eggs; but the domestic kind, breeding almost every month, supports the remark of the Roman naturalist.

All of the passerine order lay from four to six eggs; except the titmouse and the wren, which lay 15 or 18, and the goatfucker, which lays only two.

The struthious order, which consists but of two genera, disagree much in the number of eggs: the ostrich laying many, as far as 50; the dodo, but one.

System.

System.

The cloven-footed water-fowl, or waders, lay, in general, four eggs: The crane and the Norfolk plover, seldom more than two. All those of the snipe and plover genus are of a dirty white, or olive spotted with black, and scarce to be distinguished in the holes they lay in. The bird called the Land Rail, (an ambiguous species,) lays from 15 to 20. Of birds with pinnated feet, the coot lays seven or eight eggs, and sometimes more. Grebes, from four to eight, and those white.

The web-footed, or swimmers, differ in the number of their eggs. Those which border on the order of waders, lay few eggs; the avoet, two; the flamingo, three; the albatros, the auks, and guillemots, lay only one egg a-piece: the eggs of the two last are of a size strangely large in proportion to the bulk of the birds. They are commonly of a pale green colour, spotted, and striped variously, that not two are alike; which gives every individual the means of distinguishing its own on the naked rock, where such multitudes assemble.

Divers, only two.

Terns and gulls lay about three eggs, of a dirty olive, spotted with black.

Ducks lay from eight to twenty eggs; the eggs of all the genus are of a pale green, or white, and unspotted.

Penguins probably lay but one egg.

Of the pelican genus, the gannet lays but one egg; the shags or corvorants, six or seven, all white; the last, the most oblong of eggs.

A minute account of the eggs of birds might occupy a treatise of itself. This is only meant to shew the great conformity nature observes in the shape and colours of the eggs of congenerous birds; and also, that she keeps the same uniformity of colour in the eggs, as in the plumage of the birds they belong to.

Zinanni published, at Venice, in 1737, a treatise on eggs, illustrated with accurate figures of 106 eggs. Mr Reyger of Dantzick published in 1766, a posthumous work by Klein, with 21 plates, elegantly coloured: but much remains for future writers.

SECT. IV. System.

CONSIDERING the many systems that have been offered to the public of late years, Mr Pennant gives the preference to that composed by Mr Ray in 1667, and afterwards published in 1678; but observes, at the same time, that it would be unfair to conceal the writer, from whom our great countryman took the original hint of forming that system which has proved the foundation of all that has been composed since that period.

It was a Frenchman, Belon of Mans, who first attempted to range birds according to their natures; and performed great matters, considering the unenlightened age he lived in; for his book was published in 1555. His arrangement of rapacious birds is as judicious as that of the latest writers. For his second chapter treats of vultures, falcons, shrikes, and owls: in the two next, he passes over to the web-footed water-fowl, and to the cloven-footed: in the fifth, he includes the gallinaceous and struthious; but mixes with them the

plovers, buntings, and larks: in the sixth are the pies, pigeons, and thrushes; and the seventh, takes in the rest of the passerine order.

Notwithstanding the great defects that every naturalist will at once see in the arrangement of the lesser birds of this writer, yet he will observe a rectitude of intention in general, and a fine notion of system, which was left to the following age to mature and bring to perfection. Accordingly, Mr Ray, and his illustrious pupil the Hon. Francis Willughby, assumed the plan; but, with great judgment, sung into their proper Rations and proper genera those which Belon had confusedly mixed together. They formed the great division of terrestrial and aquatic birds; they made every species occupy their proper place, consulting at once exterior form and natural habit. They could not bear the affected intervention of aquatic birds in the midst of terrestrial birds. They placed the last by themselves; clear and distinct from those whose haunts and economy were so different.

The subjoined scheme of arrangement by Mr Pennant, is introduced with the following observations.

"Mr Ray's general plan is so judicious, that to me it seems scarce possible to make any change in it for the better: yet, notwithstanding he was in a manner the founder of systematic Zoology, later discoveries have made a few improvements on his labours. My candid friend Linnæus will not take it amiss, that I, in part, neglect his example: for I permit the land-fowl to follow one another, undivided by the water-fowl, the grallæ and anseres of his system;* but, in my generic arrangement, I most punctually attend to the order he has given in his several divisions, except in those of his anseres, and a few of his grallæ. For, after the manner of Mr Brisson, I make a distinct order of water-fowl with pinnated feet, placing them between the waders or cloven-footed water-fowl and the web-footed. The ostrich, and land-birds with wings useless for flight, I place as a distinct order. The trumpeter (*psophia Linnæi*), and the buffards, I place at the end of the gallinaceous tribe. All are land-birds. The first multiparous, like the generality of the gallinaceous tribe; the last granivorous, swift runners, avoiders of wet-places; and both have bills somewhat arched. It must be confessed, that both have legs naked above the knees; and the last, like the waders, lay but few eggs. They seem ambiguous birds that have affinity with each order; and it is hoped, that each naturalist may be indulged the toleration of placing them as suits his own opinion."

"See Zoology."

TABLE of Pennant's ARRANGEMENT, with the correspondent ORDERS and GENERA in the SYSTEMA NATURÆ of Linnæus.

DIVISION I. LAND-BIRDS. DIV. II. WATER-FOWL.	
Divis. I. {	Order I. Rapacious. <i>Accipitres</i> LINNÆI.
	II. Pies. <i>Pica</i> .
	III. Gallinaceous. <i>Gallina</i> .
	IV. Columbine. <i>Passeres</i> .
	V. Passerine. <i>Passeres</i> .
	VI. Struthious. { <i>Gallina</i> . <i>Grallæ</i> .

Order

Arrange-
ment.

Arrange-
ment.

Divis. II.	Order VII. Cloven-footed or Waders.	<i>Gralle.</i>
	VIII. Pinnated feet.	<i>Anseres.</i> <i>Grallæ.</i>
	IX. Web-footed.	<i>Anseres.</i> <i>Grallæ.</i>

42 Chatterer	<i>Ampelis</i>	43 Coby	<i>Loxia</i>
43 Grosbeak	<i>Loxia</i>	50 Wagtail	<i>Motacilla</i>
45 Bunting	<i>Emberiza</i>	51 Warblers	<i>Motacilla</i>
46 Tanager	<i>Tanagra</i>	52 Manakins	<i>Pipra</i>
47 Finch	<i>Pringilla</i>	53 Titmouse	<i>Parus</i>
48 Flycatcher	<i>Melicospa</i>	54 Swallow	<i>Hirundo</i>
49 Lark	<i>Alauda</i>	55 Goshawk	<i>Caprimulgus</i>

DIV. I.

ORD. VI. STRUTHIOUS.

ORD. I. RAPACIOUS.

56 Dodo	<i>Didus</i>	57 Ostrich	<i>Struthio</i>
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1 Vulture	<i>Vultur</i>	3 Owl	<i>Strix</i>
2 Accipiter	<i>Fulco</i>	4 Shrike	<i>Lanius</i>

DIV. II.

ORD II. PIES.

ORD. VII. CLOVEN-FOOTED, or WADERS.

5 Parrot	<i>Pittacus</i>	17 Barbet	<i>Buccon</i>
6 Toucan	<i>Rumphaflos</i>	18 Cuckoo	<i>Cuculus</i>
7 Motmot	<i>Rumphaflos</i>	19 Wren	<i>Tyrus</i>
8 Hornbill	<i>Buccon</i>	20 Woodpecker	<i>Picus</i>
9 Bee-eater	<i>Buphaga</i>	21 Jacamar	<i>Alcedo</i>
10 Ani	<i>Ceryle</i>	22 Kingfisher	<i>Alcedo</i>
11 Crow	<i>Corvus</i>	23 Nuthatch	<i>Sitta</i>
12 Roller	<i>Coracias</i>	24 Toody	<i>Todus</i>
13 Oriole	<i>Oriolus</i>	25 Bee-eater	<i>Merops</i>
14 Grackle	<i>Gracula</i>	26 Hoopoe	<i>Upupa</i>
15 Parakeet	<i>Paradisæa</i>	27 Creeper	<i>Certhia</i>
16 Curucui	<i>Trogon</i>	28 Honeyfucker	<i>Trochilus</i>

58 Spoonbill	<i>Platania</i>	66 Snipe	<i>Scolopax</i>
59 Screamer	<i>Palamedea</i>	67 Sandpiper	<i>Tringa</i>
60 Jabiru	<i>Nycteria</i>	68 Plover	<i>Charadrius</i>
61 Boathill	<i>Cancruma</i>	69 Oystercatcher	<i>Henotopus</i>
62 Heron	<i>Ardea</i>	70 Jacana	<i>Petra</i>
63 Umbre	<i>Scopus</i>	71 Pratincole	<i>Hirundo</i>
64 Ibis	<i>Tantalus</i>	72 Rail	<i>Rallus</i>
65 Curlew	<i>Scolopax</i>	73 Gallinule	<i>Fulica</i>

ORD. VIII. PINNATED-FEET.

74 Phalarope	<i>Tringa</i>	76 Grebe	<i>Columbus</i>
75 Coot	<i>Fulca</i>		

ORD. III. GALLINACEOUS.

ORD. IX. WEB-FOOTED.

29 Cock	<i>Phasianus</i>	34 Pheasant	<i>Phasianus</i>
30 Turkey	<i>Melagris</i>	35 Grouse	<i>Tetrao</i>
31 Pintado	<i>Nimidia</i>	36 Partridge	<i>Tetrao</i>
32 Curlew	<i>Crax</i>	37 Trumpeter	<i>Pipha</i>
33 Peacock	<i>Pavo</i>	38 Bustard	<i>Ovis</i>

77 Avocet	<i>Recurvirostra</i>	86 Gull	<i>Larus</i>
78 Courier	<i>Curra</i>	87 Petrel	<i>Procellaria</i>
79 Flammant	<i>Phanicopterus</i>	88 Merganser	<i>Anas</i>
80 Albatross	<i>Diomedea</i>	89 Duck	<i>Anas</i>
81 Auk	<i>Alca</i>	90 Penguin	<i>Diomedea</i>
82 Guillemot	<i>Columbus</i>	91 Pelican	<i>Phalacrocorax</i>
83 Diver	<i>Columbus</i>	92 Tropic	<i>Phaeton</i>
84 Skimmer	<i>Rhyncops</i>	93 Darter	<i>Platys</i>
85 Tern	<i>Sterna</i>		

ORD. IV. COLUMBINE.

39 Pigeon	<i>Columba</i>
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ORD. V. PASSERINE.

40 Starc	<i>Sturnus</i>	41 Thrush	<i>Turdus</i>
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For Linnaeus's Arrangement, see ZOOLOGY.

ORN

ORN

Ornitho-
mancy,
Orbus.

Oroonoko
||
Orpheus.

ORNITHOMANCY, a species of divination performed by means of birds; being the same with augury. See DIVINATION and AUGURY.

ORBUS, BITTER VETCH; a genus of the diandria order, belonging to the diadelphia class of plants. There are nine species. All of them have fibrous roots, which are perennial, but are annual in stalk, rising early in spring and decaying in autumn. They are very hardy plants, and prosper in any common soil of a garden. Most of the sorts are very floriferous, and the flowers conspicuous and ornamental for adorning the flower compartments. The flowers are universally of the papilionaceous or butterfly kind, consisting each of four irregular petals, i. e. a standard, two wings, and a keel; and are all succeeded by long taper seed-pods, furnishing plenty of ripe seed in autumn; by which the plants may be propagated abundantly, as also by parting the roots.

The Scots Highlanders have a great esteem for the tubercles of the roots of the tuberous, or species sometimes called wood-pea. They dry and chew them in general to give a better relish to their liquor; they also affirm that they are good against most disorders of the breast, and that by the use of them they are enabled to resist hunger and thirst for a long time. In Breadalbane and Ross-shire, they sometimes bruise and steep them in water, and make an agree-

able fermented liquor with them. They have a sweet taste, something like the roots of liquorice; and when boiled, we are told, they are nutritious and well flavoured; and in times of scarcity, they have served as a substitute for bread.

OROONOKO, a great river of terra firma, in South America, which rises in Popayan, and falls into the sea with 16 mouths.

ORPHAN, a fatherless child, or minor; or one that is deprived both of father and mother.

ORPHEUS, a celebrated poet and musician of antiquity. His reputation was established as early as the time of the Argonautic expedition, in which he was himself an adventurer; and is said by Apollonius Rhodius not only to have incited the Argonauts to row by the sound of his lyre, but to have vanquished and put to silence the fires by the superiority of his strains. Yet, notwithstanding the great celebrity he had so long enjoyed, there is a passage in Cicero, which says, that Aristotle, in the third book of his *Poetics*, which is now lost, doubted if such a person as Orpheus ever existed. But as the work of Cicero, in which this passage occurs, is in dialogue, it is not easy to discover what was his own opinion upon the subject, the words cited being put into the mouth of Caius Cotta. And Cicero, in other parts of his writings, mentions Orpheus as a person of whose exist-

Orpheus. ence he had no doubts. There are several ancient authors, among whom is Suidas, who enumerates five persons of the name of *Orpheus*, and relates some particulars of each. And it is very probable that it has fared with Orpheus as with Hercules, and that writers have attributed to *one* the actions of *many*. But, however that may have been, we shall not attempt to collect all the fables that poets and mythologists have invented concerning him; they are too well known to need insertion here. We shall, therefore, in speaking of him, make use only of such materials as the best ancient historians, and the most respectable writers among the moderns, have furnished towards his history.

Dr Cudworth, in his *Intellectual System*, after examining and confuting the objections that have been made to the being of an Orpheus, and with his usual learning and abilities clearly establishing his existence, proceeds, in a very ample manner, to speak of the opinions and writings of our bard, whom he regards not only as the first musician and poet of antiquity, but as a great mythologist, from whom the Greeks derived the Thracian religious rites and mysteries.

"It is the opinion (says he) of some eminent philologists of later times, that there never was any such person as Orpheus, except in Fairy-land; and that his whole history was nothing but a mere romantic allegory, utterly devoid of truth and reality. But there is nothing alleged for this opinion from antiquity, except the one passage of Cicero concerning Aristotle: who seems to have meant no more than this, that there was no such poet as Orpheus, anterior to Homer; or that the verses vulgarly called *Orphical*, were not written by Orpheus. However, if it should be granted that Aristotle had denied the existence of such a man, there seems to be no reason why his single testimony should preponderate against the universal consent of all antiquity: which agrees, that Orpheus was the son of Oeager, by birth a Thracian, the father or chief founder of the mythological and allegorical theology amongst the Greeks, and of all their most sacred religious rites and mysteries; who is commonly supposed to have lived before the Trojan war, that is, in the time of the Israelitish judges, or at least to have been senior both to Hesiod and Homer; and to have died a violent death, most affirming that he was torn in pieces by women. For which reason, in the vision of Herus Pamphilius, in Plato, Orpheus's soul passing into another body, is said to have chosen that of a swan, a reputed musical animal, on account of the great hatred he had conceived for all women, from the death which they had inflicted on him. And the historic truth of Orpheus was not only acknowledged by Plato, but also by Iocrates, who lived before Aristotle, in his oration in praise of Bursia; and confirmed by the grave historian Diodorus Siculus, who says, that Orpheus diligently applied himself to literature, and when he had learned τα μυθολογικα, or the mythological part of theology, he travelled into Egypt, where he soon became the greatest proficient among the Greeks in the mysteries of religion, theology, and poetry. Neither was his history of Orpheus contradicted by Origen, when so justly provoked by Celsus, who had preferred him to our Saviour; and,

according to Suidas, Orpheus the Thracian was the first inventor of the religious mysteries of the Greeks, and that religion was thence called *Threskeia*, as it was a Thracian invention. On account of the great antiquity of Orpheus, there have been numberless fables intermingled with his history, yet there appears no reason that we should disbelieve the existence of such a man."

The bishop of Gloucester speaks no more doubtfully of the existence of Orpheus, than of Homer and Hesiod, with whom he ranks him, not only as a poet, but also as a theologian, and founder of religion.

The family of Orpheus is traced by Sir Isaac Newton for several generations: "Sefac passing over the Hellespont, conquers Thrace; kills Lycurgus, king of that country; and gives his kingdom and one of his singing-women to Oeagrus, the son of Tharops, and father of Orpheus; hence Orpheus is said to have had the muse Calliope for his mother."

He is allowed by most ancient authors to have excelled in poetry and music, particularly the latter; and to have early cultivated the lyre, in preference to every other instrument: so that all those who came after him were contented to be his imitators; whereas he adopted no model, says Plutarch; for before his time no other music was known, except a few airs for the flute. Music was so closely connected in ancient times with the most sublime sciences, that Orpheus united it not only with philosophy, but with theology. He abstained from eating animal food; and held eggs in abhorrence as aliment, being persuaded that the egg subsisted before the chicken, and was the principle of all existence: both his knowledge and prejudices, it is probable, were acquired in Egypt, as well as those of Pythagoras many ages after.

With respect to his abstaining from the flesh of oxen, Gelfer supposes it may have proceeded from the veneration shewn to that animal so useful in tillage, in the Eleusinian mysteries, instituted in honour of Ceres, the goddess of agriculture. He might have added that, as these mysteries were instituted in imitation of those established in Egypt in honour of Osiris and Isis, this abstinence from animal food was of the the origin, and a particular compliment to Apis. But like abbé Fraguier, in an ingenious dissertation upon the *Orphic Life*, gives still more importance to the prohibition; for as Orpheus was the legislator and humanizer of the wild and savage Thracians, who were cannibals, a total abolition of eating human flesh could only be established by obliging his countrymen to abstain from every thing that had life.

With respect to theology, Diodorus Siculus tells us, that his father Oeagrus gave him his first instructions in religion, imparting to him the mysteries of Bacchus, as they were then practised in Thrace. He became afterwards a disciple of the Idæi Daëtyli in Crete, and there acquired new ideas concerning religious ceremonies. But nothing contributed so much to his skill in theological matters, as his journey into Egypt; where being initiated into the mysteries of Isis and Osiris, or of Ceres and Bacchus, he acquired a knowledge concerning initiations, expiations, funeral rites, and other points of religious worship, far superior to any one of his age and country. And being much

Orpheus.

Burney's
Hist. of
Music.
P. 320 &c.

Orpheus. much connected with the descendants of Cadmus, the founder of Thebes in Boeotia, he resolved, in order to honour their origin, to transport into Greece the whole fable of Osiris, and apply it to the family of Cadmus. The credulous people easily received this tale, and were much flattered by the institution of the ceremonies in honour of Osiris. Thus Orpheus, who was held in great veneration at the Grecian Thebes, of which he was become a citizen, admirably adapted this fable, and render it respectable, not only by his beautiful verses, and manner of singing them, but by the reputation he had acquired of being profoundly skilled in all religious concerns.

At his return into Greece, according to Pausanias, he was held in the highest veneration by the people, as they imagined he had discovered the secret of expiating crimes, purifying criminals, curing diseases, and appeasing the angry gods. He formed and promulgated an idea of a hell, from the funeral ceremonies of the Egyptians, which was received throughout all Greece. He instituted the mysteries and worship of Hecate among the Egines, and that of Ceres at Sparta.

Justin Martyr says, that he introduced among the Greeks near 360 gods; Hesiod and Homer pursued his labours, and followed the same clue, agreeing in the like doctrines, having all drank at the same Egyptian fountain.

Profane authors look upon Orpheus as the inventor of that species of magic called *evocation of the manes*, or raising ghosts; and indeed the hymns which are attributed to him are mostly pieces of incantation, and real conjuration. Upon the death of his wife Eurydice, he retired to a place in Thesprotia, called *Aornas*, where an ancient oracle gave answers to such as evoked the dead. He there fancied he saw his dear Eurydice, and at his departure flattered himself that he followed him; but upon looking behind him, and not seeing her, he was so afflicted, that he soon died of grief.

There were persons among the ancients who made public profession of conjuring up ghosts, and there were temples where the ceremony of conjuration was to be performed. Pausanias speaks of that which was in Thesprotia, where Orpheus went to call up the ghost of his wife Eurydice. It is this very journey, and the motive which put him upon it, that made it believed he went down into hell.

But it is not only the poets who speak of conjuring up spirits; examples of it are to be found both in sacred and profane history. Periander, the tyrant of Corinth, visited the Thesprotians, to consult his wife about something left with her in trust; and we are told by the historians, that the Lacedæmonians having starved Pausanias their general to death, in the temple of Pallas, and not being able to appease his manes, which tormented them without intermission, sent for the magicians from Thessaly, who, when they had called up the ghosts of his enemies, so effectually put to flight the ghost of Pausanias, that it never more chose to shew its face.

The poets have embellished this story, and given to the lyre of Orpheus, not only the power of silencing Cerberus, and of suspending the torments of Tartarus, but also of charming even the infernal dei-

ties themselves, whom he rendered so far propitious to his intreaties as to restore to him Eurydice, upon condition that he would not look at her till he had quitted their dominions; a blessing which he soon forfeited by a too eager and fatal curiosity.

All dangers past, at length the lovely bride
In safety goes, with her melodious guide;
Longing the common light again to share,
And draw the vital breath of upper air:
He first, and close behind him follow'd she;
For such was Proserpine's severe decree.
When strong desires th' impatient youth invade,
By little caution, and much love betray'd:
A fault which easy pardon might receive,
Were lovers judges, or could hell forgive.
For near the confines of ethereal light,
And longing for the glimm'ring of a sight,
Th' unwary lover cast a look behind,
Forgetful of the law, nor milder of his mind.
Straight all his hopes exhal'd in empty smoke;
And his long toils were forfeit for a look.

DRYDEN'S Virgil.

Tzetzes explains the fable of his drawing his wife Eurydice from hell, by his great skill in medicine, with which he prolonged her life, or, in other words, snatched her from the grave. Æsculapius, and other physicians, have been said to have raised from the dead, those whom they had recovered from dangerous diseases.

The bishop of Gloucester, in his learned, ample, and admirable account of the Eleusinian mysteries, says, "While these mysteries were confined to Egypt their native country, and while the Grecian lawgivers went thither to be initiated, as a kind of designation to their office, the ceremony would be naturally described in terms highly allegorical. This way of speaking was used by Orpheus, Bacchus, and others; and continued even after the mysteries were introduced into Greece, as appears by the fables of Hercules, Castor, Pollux, and Theseus's descent into hell; but the allegory was so circumstantial, as to discover the truth concealed under it. So Orpheus is said to get to hell by the power of his harp:

Turchia fretus citior, fidibusque canoris.

VIRG. ÆN. VI. ver. 119.

That is, in quality of lawgiver; the harp being the known symbol of his laws, by which he humanized a rude and barbarous people.—Had an old poem, under the name of *Orpheus*, entitled, *A descent into Hell*, been now extant, it would perhaps have shewn us, that no more was meant than Orpheus's initiation."

Many ancient writers, in speaking of his death, relate, that the Thracian women, enraged at being abandoned by their husbands, who were disciples of Orpheus, concealed themselves in the woods, in order to satiate their vengeance; and, notwithstanding they postponed the perpetration of their design some time thro' fear, at length, by drinking to a degree of intoxication, they so far fortified their courage as to put him to death. And Plutarch assures us, that the Thracians stigmatized their women, even in his time, for the barbarity of this action.

Our venerable bard is defended by the author of the *Divine Legation*, from some insinuations to his disadvantage in Diogenes Laertius. "It is true (says he) if uncertain report was to be believed, the mysteries were

Orpheus. were corrupted very early; for Orpheus himself is said to have abused them. But this was an art the debauched mythæ of later times employed to varnish their enormities; as the detested pederafts of after-ages, scandalized the blameless Socrates. Besides, the story is so ill laid, that it is detected by the surest records of antiquity: for in consequence of what they fabled of Orpheus in the mysteries, they pretended he was torn in pieces by the women; whereas it appeared from the inscription on his monument at Dium in Macedonia, that he was struck dead with lightning, the envied death of the reputed favourites of the gods."

This monument at Dium, consisting of a marble urn on a pillar, was still to be seen in the time of Pausanias. It is said, however, that his sepulchre was removed from Libethra, upon mount Olympus, where Orpheus was born, and from whence it was transferred to Dium by the Macedonians, after the ruin of Libethra by a sudden inundation which a dreadful storm had occasioned. This event is very minutely related by Pausanias.

Vigil bestows the first place in his Elysium upon the legislators, and those who brought mankind from a state of nature into society:

Magnanimi heroi, nati melioribus annis.

At the head of these is Orpheus, the most renowned of the European law-givers, but better known under the character of poet: for the first laws being written in measure, to allure men to learn them, and, when learnt, to retain them, the fable would have it, that by the force of harmony Orpheus softened the savage inhabitants of Thrace:

*Threicius longa cum veste sacerdos
Obloquitur numeris septum discrimina vocum;
Tanque eadem digitis, jam pectine pulsus eburnis.*

ÆN. lib. vi. ver. 645.

The seven strings given by the poet in this passage to the lyre of Orpheus, is a circumstance somewhat historical. The first Mercurian lyre had, at most, but four strings. Others were afterwards added to it by the second Mercury, or Amphion: but according to several traditions preserved by Greek historians, it was Orpheus who completed the second tetrachord, which extended the scale to a heptachord, or seven sounds, implied by the *septem discrimina vocum*. For the assertion of many writers, that Orpheus added two new strings to the lyre, which before had seven, clashes with the claims of Pythagoras to the invention of the octachord, or addition of the sound *proslambanomenos* to the heptachord, of which almost all antiquity allows him to have been the inventor. And it is not easy to suppose, that the lyre should have been represented in ancient sculpture with four or five strings only, if it had had nine so early as the time of Orpheus, who flourished long before sculpture was known in Greece. See the article **LYRE**.

With respect to the writings of Orpheus, he is mentioned by Pindar as author of the Argonautics, and Herodotus speaks of his Orphics. His hymns, says Pausanias, were very short, and but few in number: the Lycomides, an Athenian family, knew them by heart, and had an exclusive privilege of singing them, and those of their old poets, Musæus, Onomacritus,

Pamphus, and Olen, at the celebration of the Eleusinian mysteries; that is, the priesthood was hereditary in this family.

Jamblicus tells us, that the poems under the name of Orpheus were written in the Doric dialect, but have since been transdialected, or modernised. It was the common opinion in antiquity that they were genuine; but even those who doubted of it, gave them to the earliest Pythagoreans, and some of them to Pythagoras himself, who has frequently been called the *follower of Orpheus*, and been supposed to have adopted many of his opinions.

Of the poems that are still subsisting under the name of Orpheus, which were collected and published at Nuremberg 1702, by Andr. Christ. Eschenbach, and which have been since reprinted at Leipzig 1764, under the title of *ORPHEÏΣ ΑΠΑΝΤΑ*, several have been attributed to Onomacritus, an Athenian, who flourished under the Pysistratids, about 500 years before Christ. Their titles are, 1. The Argonautics, an epic poem. 2. Eighty-six hymns; which are so full of incantations and magical evocation, that Daniel Heinsius has called them *veram Satane liturgiam*, "the true liturgy of the devil." Pausanias, who made no doubt that the hymns subsisting in his time were composed by Orpheus, tells us, that tho' less elegant, they had been preferred for religious purposes to those of Homer. 3. *De lapidibus*, a poem on precious stones. 4. Fragments, collected by Henry Stevens. Orpheus has been called the *inventor*, or at least the *propagator*, of many arts and doctrines among the Greeks. 1. The combination of letters, or the art of writing. 2. Music, the lyre, or cithara, of seven strings, adding three to that of Mercury. 3. Hexameter verse. 4. Mysteries and theology. 5. Medicine. 6. Magic and divination. 7. Astrology. Servius upon the sixth *Æneid*, p. 450, says Orpheus first instituted the *harmony of the spheres*. 8. He is said likewise to have been the first who imagined a *plurality of worlds*, or that the moon and planets were inhabited.

ORPIMENT, in natural history, a fossil substance usually found in copper-mines, composed of thin flakes like the scales; these easily split, are flexible, not elastic, soluble in oil, fusible in a moderate fire, and yield in burning an offensive smell like garlic.

ORPINE, in botany. See **SADUM**.

ORRERY, a curious machine for representing the motions or phases of the heavenly bodies. See **ASTRONOMY**, n° 317.

It would be too great an undertaking here to give an account of the mechanism of the larger sort of orreries, which represent the movements of all the heavenly bodies; nor indeed can it be done either by diagram or description, to render it intelligible to the most discerning reader: but, instead of that, we shall exhibit an idea of the theory and structure of an useful, concise, and portable planetarium, which any gentleman may have made for a small expence, and will exhibit, very justly, the motions of all the primary planets about the sun, by wheel-work; and those that have secondaries, or moons, may have them placed about their primaries moveable by the hand, so that the whole shall be a just representation of the solar system, or true state of the heavens, for any given time of the year.

Orpheus
||
Ortery.

Orrey
Orfeto.

Orfi
Orthogra-
phy.

In order to this we must compare, and find out the proportion, which the periodical times, or revolutions of the primary planets, bear to that of the earth: And they are such as are expressed in the table below, where the first column is the time of the earth's period in days and decimal parts; the second, that of the planets; the third and fourth are numbers in the same proportion to each other: as,

365,25 : 83	$\frac{3}{2}$: 83 : 20, for Mercury.
365,25 : 224,7	$\frac{1}{2}$: 52 : 32, for Venus.
365,25 : 686,9	$\frac{1}{2}$: 40 : 75, for Mars.
365,25 : 4332,5	$\frac{1}{2}$: 7 : 83, for Jupiter.
365,25 : 10759,3	$\frac{1}{2}$: 5 : 148, for Saturn.

If we now suppose a spindle or arbor with fix wheels fixed upon it in an horizontal position, having the number of teeth in each, corresponding to the numbers in the third column, viz. the wheel AM of 83 teeth, BL of 52, CK of 50 (for the earth), DI of 40, EH of 7, and FG of 5; and another set of wheels moving freely about an arbor, having the number of teeth in the fourth column, viz. AN of 20, BO of 32, CP of 50 (for the earth), DQ of 75, ER of 83, and FS of 148; then, if those two arbors of fixed and moveable wheels are made of the size, and fixed at the distance from each other, as here represented in the scheme, the teeth of the former will take those of the latter, and turn them very freely when the machine is in motion.

These arbors, with their wheel, are to be placed in a box, of an adequate size, in a perpendicular position: the arbor of fixed wheels to move in pivots at the top and bottom of the box; and the arbor of moveable wheels to go thro' the top of the box, to a proper height, on the top of which is to be placed a round ball, gilt with gold to represent the sun. On each of the moveable wheels is to be fixed a socket, or tube, ascending above the top of the box, and having on the top a wire fixed, and bent at a proper distance into a right angle upwards, bearing on the top a small round ball, representing its proper planets.

If then on the lower part of the arbor of fixed wheels be placed a pinion of screw-teeth, a winch turning a spindle with an endless screw, playing in the teeth of the arbour, will turn it with all its wheels; and these wheels will move the others about, with their planets, in their proper and respective periods of time, very exactly. For while the fixed wheel CK moves its equal CP once round, the wheel AM will move AN a little more than four times round, and so will nicely exhibit the motion of Mercury; and the wheel

FG will turn the wheel FS about $\frac{1}{29,5}$ round, and so will truly represent the motion of Saturn; and the same is to be observed of all the rest.

ORREY (Earls of). See BOYLE.

ORRICE. See IRIS.

ORSATO (Sertorio), a celebrated antiquarian, historian, and poet, was born at Padua, in 1617, and early discovered a taste for literature and the sciences. He applied himself to searching out antiquities and ancient inscriptions; for which purpose he travelled thro' all the different parts of Italy, and in the mean time poetry was his amusement. When advanced in age, he taught natural philosophy in the university of Padua. He was also a member of the academy of the

Ricovrati. Having presented to the doge and senate of Venice, the history of Padua, which he had dedicated to them, he made a long speech, during which he struggled with a natural want, and died of suppression of urine, on the 3d of July 1678. He wrote a great number of books which are esteemed, some in Latin, and others in Italian.

He ought not to be confounded with John Baptist ORSATO, an able physician and antiquary, who was born at Padua, in 1673, and wrote, 1. *Dissertatio epistolaris de Lucernis antiquis*. 2. A dissertation *De patera antiquorum*. 3. A small treatise *De fiernis veterum*; and some other works.

ORSI (John Joseph), an ingenious philologist and poet, was born at Bologna in the year 1652; and studied polite literature, philosophy, the civil law, and mathematics. His house was a kind of academy, where many persons of literature regularly assembled. He wrote many ingenious sonnets, pastorals, and other works in Italian, and died in 1733.

ORTEGAL CAPE, the most northern promontory of Spain, where there is also a castle of the same name. W. Long. 8. 20. N. Lat. 44. 0.

ORTELIUS (Abraham), a celebrated geographer, born at Antwerp, in 1527, was well skilled in the languages and the mathematics; and acquired such reputation by his skill in geography, that he was sur-named the *Ptolemy of his time*. Justus Lipsius, and most of the great men of the 16th century, were Ortelius's friends. He resided at Oxford, in the reign of Edward VI. and came a second time into England, in 1577. His *Theatrum Orbis* was the completest work of the kind that had ever been published, and gained him a reputation equal to his immense labour in compiling it. He also wrote several other excellent geographical works; the principal of which are his *Theatrum*, and his *Synonyma Geographica*. The world is likewise obliged to him for the *Britannia*, which he persuaded Camden to undertake. He died at Antwerp, in 1598.

ORTHODOX, in church-history, an appellation given to those who are found in all the articles of the Christian faith.

ORTHOGRAPHIC PROJECTION of the SPHERE, that wherein the eye is supposed to be at an infinite distance; so called, because the perpendiculars from any point of the sphere will all fall in the common intersection of the sphere with the plane of the projection. See GEOGRAPHY, n^o 13. 41. and PROJECTION.

ORTHOGRAPHY, that part of grammar which teaches the nature and affections of letters, and the just method of spelling or writing words, with all the proper and necessary letters; making one of the four greatest divisions or branches of grammar. See GRAMMAR.

ORTHOGRAPHY, in geometry, the art of drawing or delineating the fore-right plan of any object, and of expressing the heights or elevations of each part. It is called *Orthography*, for its determining things by perpendicular lines falling on the geometrical plane.

ORTHOGRAPHY, in architecture, the elevation of a building.

ORTHOGRAPHY, in perspective, is the fore-right side of any plane, i. e. the side or plane that lies parallel to a straight line, that may be imagined to pass through

Plate
CCXXX.
fig. 5.

O. thopnoea

Oryza.

Oryza,
Osborn.

through the outward convex points of the eyes, continued to a convenient length.

ORTHOPNOEA, a species or degree of asthma, where there is such a difficulty of respiration, that the patient is obliged to sit or stand upright, in order to be able to breathe. See *MEDICINE*, n° 396.

ORTNAU, a county of Germany, in the circle of Suabia, lying along the Rhine, and separating it from Alsace. It is bounded on the south by Breislau, on the north by the margravate of Baden, and on the east by the duchy of Wirtemberg. It contains three imperial towns; namely, Oßenburg, Gegenbach, and Zell. It belongs partly to the house of Austria, partly to the bishopric of Spire, and partly to the county of Hannau.

ORTIVE, in astronomy, the same with *eastern*. The ortive or eastern amplitude, is an arch of the horizon intercepted between where a star rises, and the east point of the horizon, or point where the horizon and equator intersect.

ORVIETO, a town of Italy in the patrimony of St Peter, with a bishop's see and a magnificent palace. In this place there is a deep well, into which mules descend by one pair of stairs to fetch up water, and ascend by another. It is seated on a craggy rock, near the confluence of the rivers Pagli and Chiana. E. Long. 12. 10. N. Lat. 42. 42.

ORYZA, rice; a genus of the digynia order, belonging to the hexandria class of plants. There is but one species, namely the sativa or common rice. This plant is greatly cultivated in most of the eastern countries, where it is the chief support of the inhabitants; and great quantities of it are brought into England and other European countries every year, where it is much esteemed for puddings, &c. it being too tender to be produced in these northern countries without the assistance of artificial heat; but from some seeds which were formerly sent to Carolina, there have been great quantities produced, and it is found to succeed as well there as in the eastern countries.

This plant grows upon moist soils, where the ground can be flowed over with water after it is come up. So that whoever would cultivate it in this country should sow the seeds upon a hot-bed; and when the plants are come up, they should be removed into pots filled with light rich earth, and placed in pans of water, which should be plunged into a hot-bed; and, as the water wastes, it must from time to time be renewed again. In July these plants may be set abroad in a warm situation, still preserving the water in the pans, otherwise they will not thrive; and, toward the latter end of August, they will produce their grain, which will ripen tolerably well, provided the autumn proves favourable.—The leaves of rice are long, like the reed, and fleshy; the flowers blow on the top, like barley; but the seed which follows is disposed in clusters, each of which is inclosed in a yellow husk, ending in a spiral thread. The seed is oblong, or rather oval and white.

Rice is the chief commodity and riches of Damietta in Egypt. Dr Hasselquist gives the following description of the manner in which they dress and separate it from the husks. "It is pounded by hollow iron pestles of a cylindrical form, lifted up by a wheel worked by oxen. A person sitting between the two

pestles, pushes forward the rice when the pestles are rising; another lifts, winnows, and lays it under the pestles. In this manner they continue working it until it is entirely free from chaff and husks. When clean, they add a 30th part of salt, and pound them together; by which the rice, formerly grey, becomes white. After this purification, it is passed through a fine sieve to part the salt from the rice; and then it is ready for sale." Damietta sells every year 60,800 sacks of rice, the greatest part of which goes to Turkey, some to Leghorn, Marseilles, and Venice.

Rice, according to Dr Cullen, is preferable to all other kinds of grain, both for largeness of produce, quantity of nourishment, and goodness. This, he says, is plain from macerating the different grains in water; for, as the rice swells to the largest size, so its parts are more intimately divided. Rice is said to affect the eyes; but this is purely prejudice. Thus it is alleged a particular people of Asia, who live on this grain, are blind-eyed; but if the soil be sandy, and not much covered with herbage, and as these people are much employed in the field, this affection of their eyes may be owing to the strong reflection of the rays of light from this sandy soil; and our author is the more inclined to this opinion, because no such effect is observed in Carolina, where rice is very commonly used.

Dr Percival informs us, that as a wholesome nourishment, rice is much inferior to saleg. He digested several alimentary mixtures prepared of mutton and water, beat up with bread, sea-biscuit, saleg, rice flour, sago powder, potato, old cheese, &c. in a heat equal to that of the human body. In 48 hours they had all acquired a vinous smell, and were in brisk fermentation, except the mixture with rice, which did not emit many air-bubbles, and was but little changed. The third day several of the mixtures were sweet, and continued to ferment; others had lost their intestine motion, and were sour; but the one which contained the rice was become putrid. From this experiment it appears that rice, as an aliment, is slow of fermentation, and a very weak corrector of putrefaction. It is therefore an improper diet for hospital patients; but more particularly for sailors, in long voyages, because it is incapable of preventing, and will not contribute much to check the progress of, that fatal disease, the sea-scurvy. Under certain circumstances, rice seems disposed of itself, without mixture, to become putrid. For by long keeping, it sometimes acquires an offensive fetor. Nor, according to our author, can it be considered as a very nutritive kind of food, on account of its difficult solubility in the stomach. Experience confirms the truth of this conclusion; for it is observed by the planters in the West-Indies, that the negroes grow thin, and are less able to work, whilst they subsist upon rice.

OSBORN (Francis), an eminent English writer in the 17th century. He was educated in a private manner; and at ripe years frequented the court, and was master of the horse to William earl of Pembroke. Upon the breaking out of the civil wars, he adhered to the parliament party, and had several public employments conferred upon him. In the latter part of his life he lived at Oxford, in order to print several books, and to look after his son, for whom, by the favour of the parliament, he procured a fellowship in All-souls

Ofiris fouls college. His Advice to a Son, so soon as it was published, being complained of to Dr. John Tenant, vice-chancellor of Oxford, as of irreligious tendency, there was a proposal made to have it publicly burnt; but that taking no effect, it was ordered that no bookseller or others should sell it, which only made it sell the faster. He wrote also Historical Memoirs of the reigns of queen Elizabeth and king James I.; A Discourse on the greatness and corruption of the church of Rome; A Discourse upon Machiavel, &c. He died in 1659.

OSIRIS, the son of Jupiter and Niobe, reigned over the Argives; but afterwards delivered his kingdom to his brother Ægiæus, and took a voyage into Egypt, of which he made himself master, and married Io or Isis. He established good laws there, and they were both after their death worshipped as gods.

OSNABURG, a bishopric of Germany, situated in the centre of the circle of Westphalia between the Weser and the Ems, having Minden on the east, Munster on the west, Diepholt on the north-east, and Ravenburg on the south-west. It is about 45 miles long and 25 broad, producing some rye, several sorts of turf, coals, marble, and good pasturage. The inhabitants, who are a mixture of Protestants and Roman-catholics, breed a considerable number of cattle, especially hogs, of which they make excellent bacon and hams; but a great part of the country consists of heaths. By the treaty concluded here in 1648, the bishopric was to be an alternative between the Roman-catholics and Lutherans; and the Lutheran bishop was to be a younger prince of the house of Brunswick Lunenburg, or, on failure thereof, of Brunswick Wolfenbüttele. In consequence of this settlement, his Britannic majesty's second son is now bishop of Osnaburg. The bishop is able to raise 2500 men, his revenue being between 20,000 and 30,000 l. The chief manufactures of the country are a coarse kind of linen cloth and yarn, which are said to bring into it annually above 1,000,000 of rix dollars. There are also some woollen manufactures in Osnaburg and Bramsche. The land-estates of the bishopric, are the chapter, the knights, and the four towns. The diets are held at Osnaburg, when called together by the bishop. The count of Bar is hereditary seneschal or steward, and president of the college of knights. The bishop is a prince of the empire; and, in the matricula, is rated at 6 horse and 36 foot, or 216 florins monthly in lieu of them. To the chamber of the empire he contributes, each term, 81 rix-dollars, 14 kruitzers and a half. The capital of this bishopric is

OSNABURG, or *Osnabruck*. It was formerly an imperial city, and one of the Hanse-towns; but is now subject to the bishop, though it still enjoys many privileges, and a revenue of about 8000 or 9000 rix-dollars. It has its name from a bridge over the river Hafe, or Ofé, which divides it into the Old and New Town, and stands 67 miles west of Hanover, and 30 north-east of Munster, being surrounded with walls and ditches, but commanded by a mountain within cannon-shot. The magistracy of this city, which is rechofen yearly on the second of January, is Lutheran; and the churches belong, some to the Lutherans, and some to the Papists. Both parties

have the full and free exercise of their religion, whether the bishop is Protestant or Papist. The bishop's palace was built by bishop Ernest-Augustus, brother to king George I. It is well fortified, and separated from the town by a bridge. In one of the apartments it did king George I. in the arms of his brother, on the 11th of June 1722. This was the first town in Westphalia which received the Lutheran doctrine.

OSNABURG Island, one of the islands in the South Sea discovered by captain Wallis in 1767. It is a high, round island, not above a league in circuit; in some parts covered with trees, in others a naked rock. S. Lat. 22. 48. W. Long. 141. 34.

OSSA, a mountain of Thessaly, near the Peneus, which runs between this mountain and Olympus; famous in the fabulous story of the giants, (Homer, Virgil, Horace, Seneca, Ovid.) The bending and unbending of its pines, on the blowing of a strong north wind, formed a clashing sound like thunder, (Lucan.)

OSSAT (Arnauld de); born in the diocese of Auch in 1536, of mean parentage, was taken notice of by a gentleman in the diocese, who made him study with his ward the Lord of Castlenau de Magnoac. He studied the law at Dijon under Cujace, and applied himself to the bar at Paris. He was secretary at Rome to M. de Foix, archbishop of Toulouse; to cardinal Elzé; and afterwards to cardinal de Joyeuse, by the French king's express command. After rising to the highest dignities both in church and state, in 1599 he was created a cardinal by pope Clement VIII. He died in 1604. An eminent French writer gives him the following character. "He was a man of prodigious penetration; applied himself so closely to affairs, and especially was so judicious in forming his resolutions, that it is almost impossible to find out one false step in the many negotiations in which he was concerned." His works, and especially his letters, have been much esteemed in the learned world.

OSSIAN, the son of Fingal *, a celebrated Celtic * See the article Fingal, in the APPENDIX. poet, who flourished about the end of the third and beginning of the fourth century. Several incidents in his poems point out this as his era: particularly the engagement of Fingal with Caracul, or Caracalla, the son of the emperor Severus, styled by Ossian, *The Son of the King of the world*; and another expedition under the conduct of Oscar, against the usurper Carausius, the Caros of Ossian, who assumed the purple in the year 287. This corresponds pretty nearly with the account given by the Irish histories, which place the death of Fingal in the year 283, and the death of Oscar (who died many years before his father Ossian) in the year 296.

At such a distance of time, it cannot be expected we should be able to give a particular account of the life of Ossian. The first expedition on which his father sent him, was to raise a stone on the banks of Crona, to perpetuate the memory of a victory which the king of Morven had obtained at that place. The Highlanders talk of this as being emblematical of that immortality which heroes were to receive from his future compositions. In this expedition he was accompanied by Toscar, father to the beautiful Malvina, the amiable companion of his grief, after the death of her beloved Oscar, his son. It appears from his poems, that, in one of his early expeditions to Ireland, he had

Ossian.

Ossian.

fallen in love with and married Eivallin, daughter to Branno, petty king of Lego. "I went in suit of the maid of Lego's sable furge; twelve of my people were there, the sons of freamy Morven. We came to Branno, friend of strangers; Branno of the founding mail.—'From whence,' he said, 'are the arms of thee? Not easy to win is the maid that has denied the blue-eyed sons of Erin. But blest be thou, O son of Fingal! happy is the maid that waits thee. Though twelve daughters were mine, thine were the choice, thou son of fame.'—Then he opened the hall of the maid; the dark-haired Eivallin †." This Eivallin was the mother of his son Oskar, whose exploits he celebrates in many of his poems, and whose death he laments in the first book of Temora. Eivallin died some time before Oskar; (FING. B. iv.), who seems to have been her only child; and Ossian did not marry afterwards: so that his posterity ended in the death of Oskar; who seems to have died as he was about to be married to Malvina, the daughter of Tofcar. Several of her lamentations for her lover are recorded by Ossian, which paint her grief in the strongest and most beautiful colours.—"It is the voice of my love! few are his visits to my dreams.—But thou dwellest in the soul of Malvina, son of mighty Ossian. My sighs arise with the beams of the east; my tears descend with the drops of night. I was a lovely tree in thy presence, Oskar, with all my branches round me: but thy death came like a blast from the desert, and laid my green head low; the spring returned with its showers, but no green leaf of mine arose." *Poem of CROMA.*

The principal residence of Ossian was in the vale of Cona, now Glenco, in Argyleshire. See FINGAL, in APPENDIX.

His poems relate many of his expeditions to Ireland, Scandinavia, Clyde, and Tweed or Teutha. His exploits on these occasions, after making a large allowance for poetical exaggeration, shew him to have been no less a warrior than a poet. See OSSIAN'S WORKS, in the poems *Caliban and Colnal, Lathmon, Berrathon*, &c. By these expeditions, which were always undertaken for the relief of the distressed, the mind of Ossian seems to have been cultivated and enlarged beyond what is usually to be met with in so rude a period of society as that in which he lived. His poems breathe throughout, such a spirit of generosity and tenderness, especially towards the fair sex, as is seldom or never to be met with in the compositions of other poets who lived in a more advanced state of civilisation. He lived to an extreme old age; having survived all his family and friends, many of whom perished by a fatal accident, recorded in one of his poems *called the Fall of Tura* *. Malvina, alone, the love of his son Oskar, remained with him till within a few years of his death, and paid him every attention that could be expected from the tender relation in which she stood to him. To her he addresses many of his poems, which seem to have been composed for the most part in his old age. Her death is pathetically lamented by him in the poem of *Berrathon*: towards the close of which, he gives the prefaces of his own departure; an event which he often wishes for, under the blindness and other calamities of his declining years. "Roll on, ye dark-brown years, for ye bring no joy on

"your course. Let the tomb open to Ossian, for his strength has failed. The sons of the song are gone to rest: my voice remains, like a blast, that roars, lonely, on the sea-surrounded rock, after the winds are laid. The dark mofs whistles there, and the distant mariner sees the waving trees †."—"But Ossian is a tree that is withered. Its branches are blasted and bare; no green leaf covers its boughs. From its trunk no young shoot is seen to spring. The breeze whistles in its grey mofs: the blast shakes its head of age.—The storm will soon overturn it, and strew all its dry branches with thee, O Dermid!" and with all the rest of the mighty dead, in the green winding vale of Cona *."

† Poem of Berrathon.

* *Galic Antiquities, Dermid.*

It is not certain at what age Ossian died; but from his having been long blind with years, and from the many contrasts, between his present and past situations, in poems composed, as it would appear, at a considerable distance of time from each other, it is most likely he lived to an extreme old age. The current tradition is, that he died in the house of a Culdee, called the *Son of Alpin*, with whom he is said to have held several conferences about the doctrines of Christianity. One of these dialogues is still preserved, and bears the genuine marks of a very remote antiquity; (*Dissertation prefixed to Ossian's Works.*) Several of Ossian's poems are addressed to this son of Alpin, who was probably one of those Christians whom the persecution under Dioclesian had driven beyond the pale of the Roman empire.

The poems of Ossian, tho' always held in the highest esteem by those who knew them, were allowed to remain in the obscurity of their original Galic, till Mr Macpherson, about 20 years ago, translated a collection of them into English, which immediately attracted the attention of every person who had a true taste for poetry. Dr Blair, in particular, introduced these poems into the world with those critical remarks, which do no less honour to himself than to the poet. According to that eminent critic, the two great characteristics of Ossian's poetry are tenderness and sublimity. Ossian is, perhaps, the only poet who never relaxes, or lets himself down into the light and amusing strain. He moves perpetually in the high region of the grand and pathetic. The events which he records are all serious and grave; the scenery wild and romantic. We find not in him an imagination that sports itself and dresses out gay trifles to please the fancy. His poetry, more perhaps than that of any other, deserves to be styled the *poetry of the heart*. It is a heart penetrated with noble sentiments, with sublime and tender passions; a heart that glows and kindles the fancy; a heart that is full, and pours itself forth. Of all the great poets, Homer is the one whose manner and whose times come the nearest to Ossian's. Homer's ideas were more enlarged, and his characters more diversified. Ossian's ideas fewer, but of the kind fittest for poetry; the bravery and generosity of heroes, the tenderness of lovers, and the attachment of friends. Homer is diffuse; Ossian abrupt and concise. His images are a blaze of lightning, which flash and vanish. Homer has more of impetuosity and fire; Ossian of a solemn and awful grandeur. In the pathetic, Homer has great power; but Ossian exerts that power much oftener, and has the character of tenderness more deeply im-

printed

† Fingal, B. iv.

* See *Galic Antiquities.*

Offian. printed on his works. No poet knew better how to seize and melt the heart. With regard to dignity of sentiment, we must be surprised to find that the pre-eminence must clearly be given to the Celtic bard. This appears nowhere more remarkable than in the sentiments which he expresses towards his enemies. "U-
"thal fell beneath my sword, and the sons of Berra-
"thon died.—It was then I saw him in his beauty,
"and the tear hung in my eye. Thou art fallen, young
"tree, I said, with all thy beauty round thee. Thou
"art fallen on thy plains, and the field is bare. The
"winds come from the desert, and there is no sound
"in thy leaves! Lovely art thou in death, son of car-
"borne Lathmore!*" His supposition, that all the
"little feuds and differences of this life should be forgot
"in a future state, and that those who had once been
"foes would "stretch their arms to the same shell in
"Loda," gives us the highest idea of the man as well
"as of the poet. "Daughter of beauty, thou art low!
"A strange force receives thy corse. But the ghosts
"of Morven will open their halls, when they see thee
"coming. Heroes around the feast of dim shells, in
"the midst of clouds, shall admire thee; and virgins
"shall touch the harp of mist†."—"The feuds of
"other years by the mighty dead are forgotten. The
"warriors now meet in peace, and ride together on
"the tempest's wing. No clang of the shield, no noise
"of the spear, is heard in their peaceful dwellings.
"Side by side they sit, who once mixed in battle their
"steel. There, Lochlin and Morven meet at the mu-
"tual feast, and listen together to the song of their
"bards‡."

* *Offian's Works,*
poem of
Berrathon.

† *Galic Anti-*
quities,
poem of
Trathal.

‡ *Th. poem*
of Dargo.

But the sublimity of moral sentiments, if they want-
ed the softening of the tender, would be in hazard of
giving a stiff air to poetry. It is not enough that we
admire. Admiration is a cold feeling in comparison
of that deep interest the heart takes in tender and pa-
thetic scenes. With scenes of this kind Offian abounds;
and his high merit in these is incontestable. He may
be blamed for drawing tears too often from our eyes;
but that he has the power of commanding them, no
man who has the least sensibility can question. His
poems awake the tenderest sympathies, and inspire the
most generous emotions. No reader can rise from him
without being warmed with the sentiments of humani-
ty, virtue, and honour.

But the excellency of these poems occasioned in
many persons a doubt of their authenticity. Their
genuineness, however, has been very ably defended by
Dr Blair and Lord Kames, and warmly supported by
the author of the *Galic Antiquities*, who has given the
public some more remains of Offian's poetry.

As the nature of our work will not allow us to
treat this matter at full length, we shall only give a
brief view of the arguments offered in support of the
authenticity of these poems, referring our readers to
the authors just now mentioned for fuller satisfaction.

These compositions, say they, have all the *internal*
marks of antiquity so strongly impressed upon them,
that no reader of taste and judgment can deny their
claim to it. They exhibit so lively a picture of
customs which have disappeared for ages, as could be
drawn only from nature and real life. The features
are so distinct, that few portraits of the life continual-
ly passing before us are found to be drawn with so

much likeness. The manners uniformly relate to a
very early stage of society; and no hint, no allusion
to the arts, customs, or manners, of a more advanced
period, appears throughout the poems. To that dis-
tinction of ranks, which is always found in adult so-
cieties, the poet appears to have been a perfect
stranger. The first heroes prepare their own repasts,
and indiscriminately confend to the most menial
services. Their quarrels arise from causes generally
slight, but in such a period extremely natural. A ri-
valship in love, an omission at a feast, or an affront at
a tournament, are often the foundation of a quarrel
among single heroes. And the wars in which whole
tribes are engaged, are carried on with a view, not to
enlarge their territory, but to revenge perhaps the kill-
ing of a few deer on their mountains, or the taking
forcibly away one of their women. Their occupation
was war and hunting, and their chief ambition was to
have their fame in the songs of the bards.

The notions of a future state, exhibited in these
poems, are likewise strongly marked with the charac-
ters of antiquity. A creed so uncommon that the im-
agination of a modern could not be supposed to grasp
so strong an idea of it from mere fancy, is uniformly
supported throughout. This creed is extremely simple,
but admirably suited to the times.

The language too, and the structure, of these poems,
bear the most striking characters of antiquity. The
language is bold, animated, and metaphorical, such
as it is found to be in all infant-states; where the
words, as well as the ideas and objects, must be few;
and where the language, like the imagination, is strong
and undisciplined. No abstracts, and few general terms
appear in the poems of Offian. If objects are but in-
troduced in a simile, they are always particularized.
It is "the young pine of Inishuna;" it is "the bow
of the showery Lena." This character, so conspicuous
in the poems of Offian, is a striking feature in the lan-
guage of all early states; whose objects and ideas are few
and particular, and whose ordinary conversation is of
course highly figurative and poetical. A picture, there-
fore, marked with such striking features, could not be
drawn without an original.

The whole texture of the composition is also, like
the language, bold, nervous, and concise; yet always
plain and artless; without any thing of that modern
refinement, or elaborate decoration, which attend the
advancement of literature. No foreign ornaments are
hunted after. The wild and grand nature which lay
within the poet's view, is the only source from which
he draws his ornaments. Beyond this circle, his im-
agination, though quick and rapid, seldom made any
excursion. We perceive his language always to be
that of a person who saw and felt what he describes;
who bore a part in the expeditions which he cele-
brates, and who fought in the battles which he sings.

In giving the *external* and more positive proofs of the
authenticity of Offian's poems, it is observed,—That
there have been in the Highlands of Scotland, for some
ages back, a vast many poems ascribed to Offian:
That these poems have been held in the highest veneration,
repeated by almost all persons, and on all oc-
casions. These are facts so well known, that no-
body as yet has been hardy enough to deny them:
There is not an old man in the Highlands, who will

Offian.

not declare, that he heard such poems repeated by his father and grandfather, as pieces of the most remote antiquity. There is not a district in the Highlands where there are not many places, waters, isles, caves, and mountains, which, from time immemorial, are called after the names of Ossian's heroes.—There is not a lover of ancient tale or poetry, however illiterate, who is not well acquainted with almost every single name, character, and incident, mentioned in those translations of Ossian's poems, which he may have never heard of.—Bards, who are themselves several centuries old, quote those poems, imitate them, and refer to them.—The ordinary conversation and comparisons of the Highlanders frequently allude to the customs and characters mentioned in them;—and many of their most common proverbs, established by the most ancient use, are lines borrowed from the poems of Ossian*.—

The most ancient of the clans boast of deriving their pedigree, each from some one of Ossian's heroes;—and many of the signs armorial assumed by them, are drawn from the feats ascribed to their predecessors in those poems†.—Manuscripts are mentioned, in which some of these have been preserved for several centuries ‡; and a list of living names, in different parts of the Highlands, is appealed to, as persons who still repeat a part of these poems §.—Whilst Mr Macpherson was engaged in the translation, many respectable persons, gentlemen and clergymen, avowed to the public, that these were Ossian's poems, with which they had long been acquainted, and that the translation was literal ¶. This appears also from the large specimens of the originals published and compared by proper judges. The originals lay a considerable time in the hands of the bookseller, for the inspection of the curious; they have been afterwards shown frequently to many of the best judges, and offered for publication if the editor had been favoured with subscriptions. In like manner, proposals are now circulating for printing the originals of the ancient poems lately translated by Mr Smith; a copy of which, in the event of subscriptions not coming in, is deposited with the Secretary to the *Highland Society* in London. It is likewise argued in support of the authenticity of these poems, that candid sceptics, on hearing some of them repeated by illiterate persons, who had never seen the translation, caused them to give the meaning of what they repeated, by an extempore translation into English, and by this means had all their doubts of the authenticity of Ossian removed*. They urge further, that such passages of Ossian's works as are still repeated by some old men, are among the most beautiful parts of Ossian's poems: such as the battle of Lora, the most affecting parts of Carthon, Berrathon, the death of Oscar, and Dathula, or the children of Ufnoth, &c.: which gives a credibility to his being equal to the other parts of the collection, none of it being superior to these in merit.

To these, and the like arguments advanced in support of the authenticity of the poems ascribed to Ossian, we find little objected by such as are sceptics on this head, except general assertions, That such poems could not have been composed in so early a period;—that tradition could not preserve them so long;—and the remains to be met with from oral recitation are now so inconsiderable.

To this it has been answered, That poetry has been

cultivated with most success in the earliest stages of society; that in Greece, Orpheus, Linus, Hesiod, and Homer, wrote their admirable poems some ages before any thing had been written in prose in the Greek language; that the book of Job, written in a very early period of society, is highly poetical; that among the tribes of Lapland and America, there have been found, in the earliest state, some excellent pieces of poetry. That the Caledonians in particular, had some peculiar institutions, which tended to improve their poetry: their druids were among the most learned philosophers which perhaps any age or country produced; their bards or poets were the disciples of those druids, and were always a standing order, to which none but the most promising geniuses were admitted. This standing college of poets was furnished, not only with the fruits of their own long study and observation, but also with as much as merited to be preserved of the compositions of their predecessors in office, since the "light of the song" first dawned. They had the advantage of one another's conversation; which would excite their emulation, and make them aspire to eminence: They were always present, and generally engaged, in every grand operation that was transacted; which could not fail to inspire their muse with the truest poetic fire.

The case of Ossian was particularly favourable. He lived in an age when manners came to a considerable degree of refinement under the care of the Bards and Druids. Poetry in his day was considerably advanced; and the language, though strong and figurative, had undergone some degree of cultivation, and learned to flow in regular numbers, adapted to the harp, the favourite instrument of the times. As a prince and a warrior, his mind must have been expanded and much enlarged by his excursions to other countries. At home he had Ullin, Alpin, Carril, and Ryno, to converse with; all of them poets of eminence, who would have advantaged him greatly by their example and conversation. All these advantages, meeting with a native fire and enthusiasm of genius, as in the case of Ossian, may well be supposed to have produced poems that might challenge the veneration of ages.

But it is not to their merit alone that we owe the preservation of these poems so long by oral tradition. Other circumstances concurred; of which, the institution of the Bards deserves particular notice. In a country, the only one perhaps in the world in which there was always, from the earliest period almost to the present age, a standing order of poets, we cannot reasonably be surprised, either at finding excellent poems composed, or, after being composed, carefully preserved from oblivion. A great part of the business of this order was to watch over the poems of Ossian. In every family of distinction there was always one principal bard, and a number of disciples, who vied with each other in having these poems in the greatest perfection. Should the institution of the bards last for ever, the poems of Ossian could never perish.

Nor were they only the bards of great families who took an interel in these poems: the vassal, equally fond of the song with his superior, entertained himself in the same manner. This, with a life free from care, a spirit unbroken by labour, and a space of time unoccupied by any other employment or diversion, contributed to render the Highlanders a nation of singers

* See examples under each of these heads in the *Galic Antiquities*, p. 93, 94, 95. † Ibid.

‡ p. 194. in note.

§ *Kames's Sketches*, B. i.

¶ *Galic Antiquities*, p. 95. 128.

* See list of names, *Appendix to Dr Blair's Dissertation*, Ossian's Works, 2d edit.

* Pref. to Dr Percy's *Reliques of Old English Poetry*, 2d edit.

singers and poets. From such a people, the superior merit of Osian's poems would naturally procure every encouragement, which they always retained as long as the manners of the people remained unchanged.

Many other reasons conspired to preserve the poems of Osian. The martial and intrepid spirit which they breathed, made it the interest of the chieftains to preserve them: the strain of justice, generosity, and humanity, which runs through them, recommended them to the superintendants of religion, who well knew how much the morals of a people must be tainted with those songs which they are continually repeating, and which have all the advantages of poetry and of music. In superstitious ages, the people revered these poems from their being addressed generally to some "son of the rock," supposed to be the tutelar saint of the place, or the great Irish apostle St Patrick. Besides, every hill and dale which the natives of the Highlands walked over, was classic ground. Every mountain, rock, and river, was immortalized in the song. This song would naturally be suggested by the sight of these objects, and every body would hum it as he walked along. All the proverbs and customs to which these poems gave rise, would operate in the same manner. The son would ask what they meant, and the father would repeat the song from which they were taken. The distinct and unaltered state in which the Highlanders remained for so long a course of ages, every clan, one generation after another, inhabiting the same valley, till towards the present century, contributed much to preserve their traditions and their poems; and the constant and general custom of repeating these in the winter-nights, kept them always alive in their remembrance.

To these causes and customs the preservation of Osian's poems, for so many ages, has been ascribed. But these causes and customs have ceased to exist; and the poems of Osian, of course, have ceased to be repeated.—Within a century back, the Highlands of Scotland have undergone a greater revolution than it had done for ten before that period. With a quicker pace the feudal system vanished; property fluctuated; new laws and new customs stepped in, and supplanted the old: and all this, with such sudden and such violent convulsions, as may well account for the shaking of a fabric which had stood so many ages, that it seemed to have bidden defiance to all the injuries of time. Even since Mr Macpherson gathered the poems in his collection, the amusements, employments, and taste of the Highlanders are much altered. A greater attention to commerce, agriculture, and pasturage, has quite engrossed that partial attention which was paid, even then, to the song of the bard. In twenty years hence, if manners continue to change so fast as they do at present, the faintest traces will scarce be found of these tales and poems. "Osian himself is the last of his race; and he too shall soon be no more, for 'his grey branches are already strewed on all the winds.'"

Among the causes which make these poems vanish so rapidly, poverty and the iron rod should come in for a large share. From the baneful shade of those *murderers of the muse*, the light of the song must flit retire. No other reason needs be given why the present Highlanders neglect so much the songs of their

fathers.—Once, the humble, but happy vassal, sat at his ease, at the foot of his grey rock or green tree. Few were his wants, and fewer still his cares; for he beheld his herds sporting around him, on his then unmeasured mountain. He hummed the careless song, and tuned his harp with joy, while his soul in silence blessed his children.—Now, we were going to draw the comparison:

—*sed Cynthia curre*

Vellit et admodum.

It is more agreeable to remark, as another cause for the neglect of ancient poems and traditions, the growth of industry, which fills up all the blanks of time to more advantage, and especially the increase of more useful knowledge.—But above all, the extinction of the order of the bards hastened the catastrophe of Osian's poems. By a happy coincidence Macpherson overtook the very last that remained of this order, (Macvurich, bard to Clanronald), and got his treasure. This fact (with the *red book* furnished by Mr Macdonald of Croisdart, and some other MSS.) accounts for Mr Macpherson's having found these poems in greater number and perfection than they could ever since be met with. The fragments, however, which have since been gathered, give a credibility to every thing that has been said of the original grandeur of the building.

After giving this abstract of the *arguments* urged for the authenticity of Osian's poems, and of the answers to objections started against them, we shall conclude with referring those who wish to see the subject discussed on a different footing, namely, by an appeal to *facts*, to two pamphlets recently published, *Shaw's Inquiry*, and *Clark's Answer*: From the former of which, the authenticity of Osian's poems seemed to sustain a very formidable attack; till the latter appeared, exposed the impotence of the attempt, and shewed the unshaken basis on which the object of it rested. So that now we seem authorized to conclude, without the imputation of partiality, that the controversy is at last come to an end; and that the genuineness of the poems will be as universally established in other nations, as the originals have been admired for ages in the Highlands.

OSSIFICATION, the formation of bones; but more particularly the conversion of parts naturally soft to the hardness and consistence of bones.

OSSORY, the west division of Queen's-county in Ireland.

OSSORY (Bale bishop of). See *BALE*.

OSTADE (Adrian Van), an eminent Dutch painter born at Lubec in 1610. He was a disciple of Francis Hals, in whose school Brouwer was contemporary with him, where they contracted an intimate friendship. The subjects of his pencil were always of a low kind, he having nearly the same ideas as Teniers; diverting himself with clowns and drunkards in stables, ale-houses, and kitchens. His pictures are so transparent and highly finished, that they have the polish and lustre of enamel: they have frequently a force superior to Teniers; yet it were to be wished that he had not designed his figures so short. He is perhaps one of the Dutch masters who best understood the *chiaro oscuro*; and he was often employed to paint figures for the best landscape painters of his countrymen. He died in

Offiana 1685. His works, especially those of his best time and manner, are very scarce; so that when they are to be purchased, no price is thought too much for them. His prints etched by himself, large and small, consist of 54 pieces.

OSSUNA, an ancient and considerable town of Andalusia in Spain; with an university, an hospital, and the title of a duchy. N. Lat. 37. 8. W. Long. 4. 18.

OSTALRIC, a town of Spain, in Catalonia. It had a strong castle, but was taken by the French and demolished in 1695. It is seated on the river Tordera, in E. Long. 2. 45. N. Lat. 24. 44.

OSTEND, a very strong sea-port town of the Netherlands, in Austrian Flanders, with a good harbour, and a magnificent town-house. It is not very large, but is very well fortified. This place was taken by the Dutch in 1706, but restored to the emperor in 1723; when an East India company was established here, but entirely suppressed by treaty in 1731. It was taken by the French in August 1745, after ten days siege; but rendered back by the treaty of Aix la Chapelle. E. Long. 2. 48. N. Lat. 51. 17.

OSTEOCOLLA, in natural history, though supposed by many to be an earth, is truly a crustated kind of spar debased by earth, and therefore not transparent. It is usually found coating over vegetables, or other bodies, in form of incrustations; so that the true osteocolla is a tubular crinitaceous spar of a very foul and coarse texture; and carries with it much more the appearance of a marl than of a species of spar. The masses of osteocolla, though regularly of the same figure, are very different in size; some of them not being thicker than a crow quill, while others are five and six inches in diameter; it is always, however, of a tubular figure, and a wrinkled rough surface. Osteocolla is frequent in Germany; where it is found buried near the surface of the earth, sometimes in strata of sand, but more frequently among marls; it should be chosen, for use, the purest that can be had, of a pale brown colour, and of a tolerably firm and close texture.—It has long been famous for bringing on a callos in fractured bones; its name, *osteocolla*, signifies “bone-glue,” or the “bone-binder.” It is also recommended as a diuretic, and as good in the fluor albus; but the present practice has rejected it.

OSTEOLOGY, that part of anatomy which treats of the bones. See ANATOMY, Part I.

OSTERVALD (John Frederick), a famous Protestant divine, was born at Neuchâtel in 1663; and made such rapid progress in his studies, that he became master of arts at Saumur before he was 16 years of age. He afterwards studied at Orleans and at Paris. At his return to Neuchâtel in 1699, he became pastor of the church there; and contracted a strict friendship with the celebrated John Alphonse Turretin of Geneva, and the illustrious Samuel Werenfels of Basil. The union of these three divines, which was called the *Triumvirate of the divines of Switzerland*, lasted till his death. Mr Osterwald acquired the highest reputation by his virtues, his zeal in instructing his disciples, and restoring ecclesiastical discipline. He wrote many books in French; the principal of which are, 1. A Treatise concerning the Sources of Corruption; which is a good moral piece. 2. A Catechism, or Instruction in the Christian Reli-

gion; which has been translated into German, Dutch, and English; and the Abridgment of the Sacred History, which he prefixed to it, was translated and printed in Arabic, in order to be sent to the East Indies, by the care of the Society for the propagation of the Gospel: and that Society, established in London, honoured him, by admitting him an honorary member. 3. A treatise against Impurity. 4. An edition of the French Bible of Geneva, with Arguments and Reflections, in folio. 5. *Ethica Christiana*. 6. *Theologia Compendium*, &c. He died in 1747, regretted by all who knew him.

OSTIA, a town formerly of note, on the left or south side and at the mouth of the Tiber, whence its name; the first Roman colony led by Ancus Martius, called *Colonia Ostiensis*. At this day it lies in ruins, only retaining its name. There were salt-works there, called *Salina Ostiensis*, as early as the times of Ancus Martius, (Livy); from which the *Via Salaria*, which led to the Sabines, took its name, (Varro). It gave name to one of the gates of Rome, which was called *Ostiensis*, (Ammian).

OSTIACKS, a people of Siberia in Asia, who inhabit the banks of the river Oby. See SIBERIA.

OSTRACION, in zoology, a genus of the amphibia nautes clais. It has ten long cylindrical obtuse teeth in each jaw; the aperture is linear; the body is covered with a bony tubulance, and it has no bely-fins. There are nine species; principally distinguished by the angles of their bodies, and number of fins near their tail.

OSTRACISM, in Grecian antiquity, denotes the banishment of such persons whose merit and influence gave umbrage to the people of Athens, lest they should attempt any thing against the public liberty. This punishment was called *ostracism*, from the Greek word *οστρακισμος*, which properly signifies a “shell;” but when applied to this object, it is used for the billet on which the Athenians wrote the names of the citizens whom they intended to banish. The learned are divided with regard to the substance of which this billet was formed: some insist that it was a small stone, or a piece of brick; some, that it was a piece of bark; and others assert, that it was a shell. The word admits most of these interpretations. But what determines its true sense, is the epithet given it by ancient authors, of *ceramicæ massæ*; which words signify, “The punishment of potter’s clay;” and this expression seems to us a proof, that the word *οστρακισμος*, when applied on this occasion, signifies a “piece of baked earth, in the form of a shell;” and undoubtedly the Latin authors had this idea of the word here, for they translated it by *testula*.

The ancients are likewise divided with regard to the time when ostracism was instituted. But they all agree, that the person who moved the law, was its first victim. But as to the name of its patron, and the time of its establishment, they differ extremely. Many are of opinion, that ostracism owes its origin to very remote times.

However that be, the punishment of ostracism was inflicted by the Athenians when their liberty was in danger. If, for instance, jealousy or ambition had sowed discord among the chiefs of the republic; and if different parties were formed, which threatened some

Offia

Ostracism.

Ostracism. revolution in the state; the people assembled to propose measures proper to be taken in order to prevent the consequences of a division which in the end might be fatal to freedom. Ostracism was the remedy to which they usually had recourse on these occasions; and the consultations of the people generally terminated with a decree, in which a day was fixed for a particular assembly, when they were to proceed to the sentence of ostracism. Then they who were threatened with banishment, omitted no assiduity or art which might gain them the favour of the people. They made harangues to evince their innocence, and the great injustice that would be done them if they were banished. They solicited, in person, the interest of every citizen; all their party exerted themselves in their behalf; they procured informers to vilify the chiefs of the opposite faction. Some time before the meeting of the assembly, a wooden inclosure was raised in the forum, with ten doors, *i. e.* with as many as there were tribes in the republic; and when the appointed day was come, the citizens of each tribe entered at their respective door, and threw into the middle of the inclosure the small brick on which the citizen's name was written whose banishment they voted. The archons and the senate presided at this assembly, and counted the ballots. He who was condemned by 6000 of his fellow-citizens, was obliged to quit the city within ten days; for 6000 voices, at least, were requisite to banish an Athenian by ostracism.

The Athenians, without doubt, foresaw the inconveniences to which this law was subject; but they chose rather, as Cornelius Nepos hath remarked, sometimes to expose the innocent to an unjust censure, than to live in continual alarms. Yet as they were sensible that the injustice of confounding virtue and vice would have been too flagrant, they softened, as much as they could, the rigour of ostracism. It was not aggravated with the circumstances which were most dishonourable and shocking in the ordinary mode of exile. They did not confiscate the goods of those who were banished by ostracism. They enjoyed the produce of their effects in the places into which they were banished; and they were banished only for a certain time. But in the common banishment, the goods of the exiles were always confiscated, and no hopes were given them of ever returning to Athens.

The scholiast of Aristophanes informs us of a third difference betwixt ostracism and the common banishment. He says, that a particular place of retirement was assigned to those who were banished by ostracism, which was not appointed to the other exiles. We suspect, however, the truth of this observation; for Themistocles was certainly not limited in his banishment. That great man, as we are told by Thucydides, tho' his chief residence was at Argi, travelled over all the Peloponnesus.

This punishment, far from conveying the idea of infamy, became, at Athens, a proof of merit, by the objects on which it was inflicted; as Aristides the sophist justly observes, in his second declamation against the Gorgias of Plato, where he says, that ostracism was not an effect of the vindictive spirit of the people against those whom it condemned; that the law, whether good or bad (for he enters not into an examination of the question), was only meant to prune the

luxuriant growth of transcendent merit; that it condemned to an exile of ten years, only those illustrious men who were accused of being exalted far above other citizens by their conspicuous virtue; and that none of that public indignation was shewn to the exiles by ostracism, which commonly breaks out against criminals.

Such were the mitigations with which this law was introduced among the Athenians: and by them we see that they were sensible of all the inconveniences to which it was subject. They were indeed too enlightened a people, not to foresee the many instances of injustice which it might produce; that if in some respects it would be favourable to liberty, in others it would be its enemy, by condemning citizens without allowing them a previous defence, and by making a capricious and envious people arbiters of the fate of great men; that it might even become pernicious to the state, by depriving it of its best subjects, and by rendering the administration of public affairs an odious employment to men of capital talents and virtue.

However great the inconveniences of Ostracism were, it would not have been impossible to avoid them; and we may add, that this law would have been of service to the state, if the people by whom it was instituted had always had discernment enough only to give it force on such occasions as endangered liberty. But its fate was like that of almost all other laws which the wisest legislators have planned for the good of communities. Destined by their institution to maintain order, to repress injustice, and to protect innocence, men have found ways to pervert their application, and have made them instruments to gratify their private passions. Thus ostracism was established to prevent the dangerous enterprises of the great, and to preserve the vigour of the democracy; but the people of Athens, naturally jealous and envious, exerted that law, to remove men of eminent merit from the state, by whose presence they were repressed and intimidated. The fear of tyranny was commonly but a specious pretext with which they veiled their malignity. The repeated victories which they had gained over the Persians, had rendered them, says Plutarch, proud and insolent. Intoxicated with their prosperity, they arrogated all its glory to themselves; they were jealous of those citizens, whose political and military talents were the subjects of public eulogium. They thought the glory acquired by great men diminished their own reputation. An Athenian no sooner distinguished himself by a splendid action, than he was marked out as a victim by public envy. His reputation was a sufficient reason for his banishment.

OSTRACITES, in natural history, the name which authors have given the fossil oyster-shell. Ostracites has the same medical virtues with other absorbent and calcareous earths.

OSTREA, the **OYSTER**, in zoology, a genus belonging to the order of vermes testacea. The shell has two unequal valves; the cardo has no teeth, but a small hollow it with transverse lateral streaks. There are 31 species, principally distinguished by peculiarities in their shells. The common oyster is reckoned an excellent food; and is eaten both raw, and variously prepared.

Ostracism
Ostrea.

Ofſtea.

Britain has been noted for oysters from the time of Juvenal, who, satyrizing an epicure, says,

*Circæis nata foras, an
Lucrinæ ad Saxum, Rutupinæ edita fundo,
Ofſtea, callibat primis deprendere morſus.*

He, whether Circæ's rock his oysters bore,
Or Lucrine lake, or diſtant Richborough's ſhore
Knew at firſt taſte.

The luxurious Romans were very fond of this fiſh, and had their layers or ſtews for oysters as we have at preſent. Sergius Orata was the firſt inventor, as early as the time of L. Craſſus the orator. He did not make them for the ſake of indulging his appetite, but thro' avarice, and made great profits from them. Orata got great credit for his Lucrine oysters; for, ſays Pliny, the Britiſh were not then known.

The ancients eat them raw, and ſometimes roaſted. They had alſo a cuſtom of ſtewing them with mallows and docks, or with fiſh, and eſteemed them very nourishing.

Britain ſtill keeps its ſuperiority in oysters over other countries. Moſt of our coaſts produce them naturally; and in ſuch places they are taken by dredging, and are become an article of commerce, both raw and pickled. The very ſhells, calcined, become an uſeful medicine as an abſorbent. In common with other ſhells, they prove an excellent manure.

Stews or layers of oysters are formed in places which nature never allotted as habitations for them. Thoſe near Colcheſter have been long famous; at preſent there are others that at leaſt rival the former, near the mouth of the Thames. The oysters, or their ſpats, are brought to convenient places, where they improve in taſte and ſize. It is an error to ſuppoſe, that the fine green obſerved in oysters taken from artificial beds, is owing to coppers; it being notorious how deſtructive the ſubſtance or the ſolution of it is to all fiſh. We cannot give a better account of the cauſe, or of the whole treatment of oysters, than what is preſerved in the learned biſhop Sprat's hiſtory of the Royal Society, from p. 307, to 309.

"In the month of May, the oysters caſt their ſpawn, (which the dredgers call their *ſpats*;) it is like to a drop of candle, and about the bignefs of a half-penny.

"The ſpat cleaves to ſtones, old oyster-ſhells, pieces of wood, and ſuch like things, at the bottom of the ſea, which they call *cultch*.

"It is probably conjectured, that the ſpat in 24 hours begins to have a ſhell.

"In the month of May, the dredgers (by the law of the admiralty court) have liberty to catch all manner of oysters, of what ſize ſoever.

"When they have taken them, with a knife they gently raiſe the ſmall brood from the cultch, and then they throw the cultch in again, to preſerve the ground for the future, unleſs they be ſo newly ſpat, that they cannot be ſafely levered from the cultch; in that caſe they are permitted to take the ſtone or ſhell, &c. that the ſpat is upon, one ſhell having many times 20 ſpats.

"After the month of May, it is felony to carry away the cultch, and puniſhable to take any other oysters, unleſs it be thoſe of ſize, (that is to ſay) about

the bignefs of an half-crown piece, or when, the two ſhells being ſhut, a fair ſhilling will rattle between them.

"The places where theſe oysters are chiefly caught, are called the *Pent-Burnham*, *Malden*, and *Celue-waters*; the latter taking its name from the river of Colne, which paſſeth by Colne-Cheſter, gives the name to that town, and runs into a creek of the ſea, at a place called the *Hythe*, being the ſuburbs of the town.

"This brood and other oysters, they carry to the creeks of the ſea, at Brickel-Sea, Merly, Langno, Fingrego, Wivenho, Toſebury, and Saltcoafe, and there throw them into the channel, which they call their *beds* or *layers*, where they grow and fatten, and in two or three years the ſmalleſt brood will be oysters of the ſize aforeſaid.

"Thoſe oysters which they would have green, they put into pits about three feet deep in the ſalt-marſhes, which are overflowed only at ſpring-tides, to which they have ſluices, and let out the ſalt-water until it is about a foot and half deep.

"Theſe pits, from ſome quality in the ſoil co-operating with the heat of the ſun, will become green, and communicate their colour to the oysters that are put into them in four or five days, tho' they commonly let them continue there ſix weeks or two months, in which time they will be of a dark green.

"To prove that the ſun operates in the greening, Toſebury pits will green only in ſummer; but that the earth hath the greater power, Brickel-Sea pits green both winter and ſummer: and for a further proof, a pit within a foot of a greening-pit will not green; and thoſe that did green very well, will in time loſe their quality.

"The oysters, when the tide comes in, lie with their hollow ſhell downwards; and when it goes out, they turn on the other ſide: they remove not from their place, unleſs in cold weather, to cover themſelves in the oufe.

"The reaſon of the ſcarcity of oysters, and confequently of their dearneſs, is, becauſe they are of late years bought up by the Dutch.

"There are great penalties by the admiralty court, laid upon thoſe that fiſh out of thoſe grounds which the court appoints, or that deſtroy the cultch, or that take any oysters that are not of ſize, or that do not tread under their feet, or throw upon the ſhore, a fiſh which they call a *five finger*, reſembling a ſpur-rowel, becauſe that fiſh gets into the oysters when they gape, and ſucks them out.

"The reaſon that ſuch a penalty is ſet upon any that ſhall deſtroy the cultch, is, becauſe they find that if that be taken away, the ouſe will increaſe, and the muſcles and cockles will breed there, and deſtroy the oysters, they having not whereon to ſtick their ſpat.

"The oysters are ſick after they have ſpat; but in June and July they begin to mend, and in Auguſt they are perfectly well: the male oyster is black-lick, having a black ſubſtance in the ſin; the female white-lick (as they term it), having a milky ſubſtance in the ſin. They are ſalt in the pits, ſalter in the layers, but ſaltelt at ſea."

OSTRICH, in zoology. See STRUTHIO.

"The

Ofſtea.
Ofſtrich.

Pennant's
Brit. Zool.
vol. iv.
p. 102.

Ofstuni
||
Otaheitee.

OSTUNI, a town of Italy, in the kingdom of Naples, and in the Terra di Otranto, with a bishop's see. Its territory is well cultivated, and abounds with olives and almonds. It is seated on a mountain near the gulph of Venice, in E. Long. 17. 49. N. Lat. 49. 59.

OSWEGO, a fort of North America, seated on the fourth side of the lake Ontario, in W. Long. 70. 35. N. Lat. 45. 15.

OSWEIZEN, a town of Poland, in the Palatinate of Cracovia, with the title of a duchy. It carries on a great trade in salt, and is seated on the river Vistula. E. Long. 19. 47. N. Lat. 50. 1.

OTACOUS^{TIC} INSTRUMENT, or *Auricular Tube*, an instrument to facilitate the hearing. See *Acoustics*, n° 26.

OTAHEITEE, a celebrated island of the South Sea, situated in W. Long. 149. 13. S. Lat. 17. 46. It was discovered by Captain Wallis in 1767; afterwards Mr Bougainville touched here, and it was visited by Captain Cook in 1773 and 1774.

The island consists of two distinct kingdoms, which are united by a narrow neck of land; the larger being called by the natives *Tiarrabou*, or *O-Tahitee-Nue*; the smaller one, *Opoouenou*, or *O-Tahitee-Ete*. The circumference of both islands is about 40 leagues; the larger kingdom being divided into 43 districts. The country has a delightful romantic appearance. The coast viewed from the sea, presents a most beautiful prospect, being elevated like an amphitheatre. The island is skirted with a reef of rocks, and towards the sea is level, being covered with fruit-trees of various kinds, particularly the cocoa-nut. At the distance of about three miles from the shore, the country rises into lofty hills that are covered with wood, and terminate in peaks, from which large rivers are precipitated into the sea. The stones every where appear to have been burnt, not one being found which did not give manifest signs of fire; so that there is great reason for supposing, that this and the neighbouring islands are either the shattered remains of a continent, or were torn from rocks, which from the creation of the world have been the bed of the sea, and thrown up in heaps to a height which the waters never reach. What is further extraordinary, the water does not gradually grow shallow as we approach the shore, but is of immense depth close by the land; and the islands in this neighbourhood are almost every where surrounded by reefs, which appear to be rude and broken in the manner that some violent concussion would naturally leave the solid substance of the earth; and Mr Forster saw a rock with projecting longitudinal angles of black compact basalt. The exterior ranges of hills are sometimes entirely barren, and contain a great quantity of yellowish clay, mixed with iron ochre; but others are covered with mould and wood like the mountains in the internal parts of the country. Pieces of quartz are sometimes met with here; but no indications of precious minerals or metals of any kind have been observed, iron only excepted.

The air is extremely healthy and pleasant; the heat is not troublesome; and fresh meat will keep very well for two days, and fish one day. The winds do not blow constantly from the east, but generally a little breeze from east to south-south east. The tide rises

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very little; and, being governed by the winds, is very uncertain. "The climate," says Mr Bougainville, "is so healthy, that notwithstanding the hard labour of the ships companies while on shore, though the men were continually in the water, and exposed to the meridian sun, though they slept upon the bare soil, and in the open air, none of them fell sick; those who were afflicted with the scurvy, and were sent on shore, regained their strength: although they were obliged to assist in the erecting of a fort, and had scarce one uninterrupted night, yet they were so far recovered in the short space of time they continued there, that they were afterwards perfectly cured on board."

Notwithstanding the great height of the inland mountains of Otaheitee, none of their rocks have the appearance of barrenness, every one of them being covered with woods. "We hardly believed our eyes," says M. de Bougainville, "when we saw a peak covered with woods up to its highest summit, which rises above the level of the mountains in the anterior parts of the southern quarter of this island. Its apparent size seemed to be more than 30 toises in diameter, and grew less in breadth as it rose higher. At a distance it might have been taken for a pyramid of immense height, which the hand of an able sculptor had adorned with garlands and foliage." One of the mates of the dolphin, with a party of marines and seamen, penetrated into the interior parts of the island; and having ascended, with great difficulty, a mountain which they supposed to be a mile high, they discovered mountains before them so much higher, that with respect to them they seemed to be in a valley: towards the sea the view was enchanting, the sides of the hills were beautifully clothed with wood, villages were every where interspersed, and the valleys between them afforded a still richer prospect; the houses stood thicker, and the verdure was more luxuriant; and Mr Forster, with other gentlemen, ascended to the summit of one of the highest mountains in the island, from whence they had a prospect of the island of Huahine, and some others lying at the distance of 40 leagues; from which we may form some judgment of the prodigious height of that mountain. The view of the fertile plain below them, and of a river making innumerable meanders, was delightful in the highest degree. The vegetation on the upper part of the mountains was luxuriant, and the woods consisted of many unknown sorts of trees and plants.

The soil of this island is a rich fat earth, of a blackish colour. It produces spontaneously, or with the slightest culture imaginable, a great variety of the most excellent fruits; such as bread-fruit, cocoa nuts, bananas of 13 sorts, plantains, potatoes, yams, a fruit known here by the name of *janbu*, and reckoned most delicious; sugar-canes, which the inhabitants eat raw; ginger; turmeric; a root of the fable kind, called by the inhabitants *pea*; a plant called *ehoe*, of which the root only is eaten; a fruit that grows in a pod like that of a large kidney-bean, by the natives called *abee*; a tree called *uharra*, which produces fruit something like the pine-apple, and which is known in the East Indies by the name of *pandanes*; a shrub called *nano*; the *morinda*, which also produces fruit; a species of fern; a plant called *theve*; and the Chinese paper-mulberry, of the bark of which they make their cloth;

Otaheitee.

Highmountain.

Soil and produce.

Otaheitee. an herb which the inhabitants eat raw, its flavour somewhat resembling that of the West India spinach called *calletoon*, but its leaf very different; a plant which the natives call *ava* or *earva*, from the root of which they express a liquor, which, if drank to excess, intoxicates like wine or distilled spirits. Here are a sort of shady trees covered with a dark-green foliage, bearing golden-coloured apples, which, in juiciness and flavour, resemble the ananas or pine-apple. One of the most beautiful trees in the world received here the name of *Barringtonia*; it had a great abundance of flowers larger than lilies, and perfectly white, excepting the tips of their numerous chives, which were of a deep crimson. Such a quantity of these flowers were seen dropped off, that the ground underneath the tree was entirely covered with them. The natives called the tree *buddov*; and said, that the fruit, which is a large nut, when bruised and mixed up with some shell-fish, and thrown into the sea, intoxicates the fish for some time, so that they come to the surface of the water, and suffer themselves to be taken with people's hands. Several other maritime plants in tropical climates are found to have the same quality. Mr Dalrymple describes the method of catching fish with these plants as follows: The plant is thrust under the coral rocks or hollows where the fish haunt; the effect is most sensible in still water, though it is effectual in the open sea; for the same gentleman says, he has seen fish soon after float on the surface of the water half dead, and some totally without life; and where the effect is less violent, the fish will be seen under the water to have lost their poise, without coming up to the surface. Fish caught in this manner are not in the least noxious or ill tasted.

The inhabitants of Otaheitee are a stout, well-made, active, and comely people. The stature of the men, in general, is from five feet seven to five feet ten inches; the tallest man seen by Captain Wallis measured six feet three inches and an half; and Captain Cook, in his second voyage, describes O-Too, the king of Otaheitee, to be of that height. "In order to paint "an Hercules or a Mars," says M. de Bougainville, "one could nowhere find such beautiful models." They are of a pale brown complexion; in general their hair is black, and finely frizzled; they have black eyes, flat noses, large mouths, and fine white teeth; the men wear their beards in many fashions, all of them plucking out a great part, and have prominent bellies. Most of them smell strong of the cocoa-nut oil. The women, in general, are much smaller, especially those of the lower rank or tawtows, which is attributed to their early and promiscuous intercourse with the men; whilst the better sort, who do not gratify their passions in the same unbridled manner, are above the middle stature of Europeans. Their skin is most delicately smooth and soft; they have no colour in their cheeks; their nose is generally somewhat flat, but their eyes are full of expression, and their teeth beautifully even and white. "The women," says M. de Bougainville, "have features not less agreeable than the generality of Europeans, and a symmetry of body and beautiful proportion of limbs which might vie with any of them." The complexion of the men is tawny; but those who go upon the water are much more red than those who live on shore. Some have their hair brown, red, or flaxen, in which they are exceptions to all the natives of Asia, Africa, and America, who have their hair black universally; here, in the children of both sexes, it is generally flaxen. The strongest expression is painted in the countenances of these people; their walk is graceful, and all their motions are performed with great vigour and ease. "I never beheld stouter men," says Sydney Parkinson. "The men of consequence on the island wear the nails of their fingers long, which they consider as a very honourable badge of distinction, since only such people as have no occasion to work can suffer them to grow to that length. This custom they have in common with the Chinese; but the nail of the middle finger on the right hand is always kept short, the meaning for which peculiarity could not be learned. Only one single cripple was met with among them, and he appeared to have been maimed by a fall. The women always cut their hair short round their heads. Both sexes have a custom of staining their bodies, which they call *tattooing*; both men and women have the hinder part of their thighs and loins marked very thick with black lines

Animals. In this island they have domestic poultry exactly resembling those of Europe: besides which there are wild ducks; also beautiful green turtle-doves; large pigeons of a deep blue plumage and excellent taste; a small sort of parquets, very singular on account of the various mixture of red and blue in their feathers; also another sort of a greenish colour, with a few red spots; the latter are frequently tamed, and are valued on account of their red feathers. Here is a kingfisher of a dark green, with a collar of the same hue round his white throat; a large cuckoo, and a blue heron. Small birds of various kinds dwell in the shady trees; and, contrary to the generally received opinion that birds in warm climates are not remarkable for their song, have a very agreeable note. There were no quadrupeds but dogs, hogs, and rats; and for these last the natives were said to have a scrupulous regard, inasmuch that they would by no means kill them; however, Capt. Cook, in 1773, turned about 14 cats on the island, which have probably reduced the number of these vermin. No frogs, toads, scorpions, centipedes, or any kind of serpent, have been found here: the ants, however, are troublesome, but not very numerous. When the Endeavour first arrived here in 1769, the flies were found excessively troublesome; but musketto nets and fly-flaps in some measure removed the inconvenience. Sydney Parkinson, in his journal, says, that notwithstanding these flies are so great a nuisance, the natives, from a religious principle, will not kill them. But there is a strange disagreement in the accounts of different voyagers con-

Otaheitee.

6
Description
of the inha-
bitants, &c.

Otaheite. lines in various forms; these marks are made by striking the teeth of an instrument somewhat like a comb just through the skin, and rubbing into the punctures a kind of paste made of foot and oil, which leaves an indelible stain. The boys and girls under twelve years of age are not marked; a few of the men, whose legs were marked in chequers by the same method, appeared to be persons of superior rank and authority. Mr Banks saw the operation of tattooing performed upon the backside of a girl about thirteen years old. The instrument used upon this occasion had thirty teeth; and every stroke, of which at least a hundred were made in a minute, drew an ichor or serum a little tinged with blood. The girl bore it with most stoical resolution for about a quarter of an hour; but the pain of so many hundred punctures as she had received in that time, then became intolerable. She first complained in murmurs, then wept, and at last burst into loud lamentations, earnestly imploring the operator to desist. He was, however, inexorable; and when she began to struggle, she was held down by two women, who sometimes soothed and sometimes chid her; and now and then when she was most unruly, gave her a smart blow. Mr Banks staid in a neighbouring house an hour, and the operation was not over when he went away; yet it was performed but upon one side, the other having been done some time before; and the arches upon the loins, in which they most pride themselves, and which give more pain than all the rest, were still to be done. Both men and women are not only decently but gracefully clothed, in a kind of white cloth that is made of the bark of a shrub, and very much resembles coarse China paper. Their dresses consist of two pieces of this cloth; one of them, having a hole made in the middle to put the head through, hangs down from the shoulders to the mid-leg before and behind; another piece, which is between four and five yards long, and about one yard broad, they wrap round the body in a very easy manner: This cloth is not woven; but is made like paper, of the macerated fibres of the inner bark spread out and beaten together. Their ornaments are feathers, flowers, pieces of shell, and pearls; the pearls are worn chiefly by the women. In wet weather they wear matting of different kinds, as their cloth will not bear wetting. The dresses of the better sort of women consist of three or four pieces: one piece, about two yards wide and eleven long, they wrap several times round their waist, so as to hang down like a petticoat as low as the middle of the leg; and they call *parau*. This simple drapery affords the sex an opportunity of displaying an elegant figure to the greatest advantage, according to the talents and taste of the wearer: no general fashions force them to disfigure instead of adorning themselves, but an innate carefulness is the companion of simplicity. To this cloth they give a very strong perfume.

7
Of their
houses.

The chief use which they make of their houses is to sleep in them; for unless it rains, they eat in the open air under the shade of a tree. These houses are no other than sheds, all built in the wood between the sea and the mountains: they are erected on an oblong square; their width is nearly half of their length; they are nothing more than a roof, not quite four feet from the ground, raised on three rows of pillars, one row on each side, and one in the middle. The roof resembles

our thatched houses in England, and consists of two flat sides inclining to each other. Their thatch consists of palm-leaves. The floor of their dwelling is covered with hay, over which they spread mats. Some of these erections are furnished with a stool, which is appropriated solely to the use of the master of the family: they consist of no other furniture except a few blocks of wood, which being square, one side is hollowed into a curve; and these they use as pillows, and with their apparel they cover themselves. In these open dwellings the whole family repose themselves at night. The size of the house is proportioned to the number that constitutes the family. The established order in these dormitories is, for the master and his wife to sleep in the middle; round them the married people; in the next circle the unmarried women; and in the next, at the same distance, the unmarried men; and the servants at the extremity of the shed; but in fair weather, the latter sleep in the open air. Some few dwellings, however, constructed for greater privacy, are entirely inclosed with walls of reeds, connected together with transverse pieces of wood, so as to appear somewhat like large bird-cages closely lined; in these houses there is commonly a hole left for the entrance, which can be closed up with a board.

Their candles are made of the kernels of a kind of oily nut, which they flick one above another on a skewer that is thrust through the middle of them; the upper one being lighted burns to the second, at the same time consuming that part of the skewer that goes through it; the second taking fire burns in the same manner down to the third, and so to the last; they burn a considerable time, and afford a pretty good light. The natives generally retire to rest about an hour after it is dark.

The food of the common people entirely consists of Food, meth of Food, &c. vegetables. These are, the bread-fruit, with bananas, plantains, yams, apples, and a sour fruit, which, though not pleasant by itself, gives an agreeable relish to roasted bread-fruit, with which it is frequently beaten up. See the article *BREAD-TREE*. The flesh, which is reserved for the tables of the great, is either poultry, hogs, or dogs; the flesh of their fowls is not well tasted, but that of dogs is esteemed by the natives beyond pork. The smaller fish are generally eaten raw, as we eat oysters: every thing that can be procured from the sea is made an article of their food; for they will eat not only sea-insects, but what the seamen call *blubberr*, though some of them are so tough that they are obliged to suffer them to become putrid before they can be chewed. A very large shark being caught by the Dolphin's people was given to the natives; who soon cut it to pieces, and carried it away with great satisfaction.

They kill the animals they intend for food by suffocating them, which is done by stopping the mouth and nose with their hands; they then squeeze off the hair, by holding the animal over a fire, and scraping him with a shell: with this instrument they cut him up, and take out the entrails; which are washed, and put into cocoa-nut shells, together with the blood. Dogs are eaten that are fed wholly upon bread-fruit, cocoanuts, yams, and other vegetables, and are never suffered to taste any animal food; and those who have tasted the flesh of a dog thus fed, have declared it to be little inferior to English lamb. In order to dress

their food, they kindle a fire, by rubbing the end of one piece of dry wood upon the side of another, in the manner as a carpenter with us whets a chisel. They then dig a pit about half a foot deep, and two or three yards in circumference; they pave the bottom with large pebble stones, which they lay down very smooth and even, and then kindle a fire in it with dry wood, leaves, and the husks of cocoa-nuts. When the stones are sufficiently heated, they take out the embers, and rake up the ashes on every side; they then cover the stones with a layer of green cocoa-nut leaves, and wrap up the animal that is to be dressed in the leaves of the plantain. If it is a small hog, they wrap it up whole; if a large one, they split it. When it is placed in the pit, they cover it with the hot embers, and lay upon them bread-fruit and yams, which are also wrapped up in the leaves of plantain. Over these they spread the remainder of the embers, mixing among them some of the hot stones, with more cocoa-nut-tree leaves upon them, and then close up all with earth, so that the heat is kept in; the oven is kept thus closed a longer or shorter time, according to the size of the meat that is dressed. The meat, when taken out, is said to be better dressed than any other way. They use shells for knives; and carve very dexterously with them, always cutting from themselves. One of the principal attendants on Obeera, attempting the use of the knife and fork, could not feed himself therewith; but, by the mere force of habit, his hand came to his mouth, and the victuals at the end of his fork went way to his ear.

They are quite unacquainted with the method of boiling water, as they have no vessels among them that will bear the fire. Whilst the noble Obeera was one morning at breakfast with captain Wallis on board the Dolphin, the surgeon filled the tea-pot by turning the cock of a vase that stood upon the table. One of the lady's attendants observed this practice very attentively, and soon after turning the cock himself, received the water upon his hand; he no sooner felt himself scalded, than he roared and danced about in an extravagant manner. The other Indians, unapprised of the cause of these emotions, stood gazing at him in amazement, and not without some mixture of terror: but the gentlemen in company, who soon perceived the cause of the outcry, dispelled the apprehensions of their visitors; and some ointment being applied to the scald, good-humour and confidence were again restored. The gunner of the ship, who was appointed comptroller of the market which was established on shore with the natives, used to dine on the spot; the astonishment of these people was very great to see him dress his pork and poultry in a pot; at length an old man, who was extremely servicable in bringing down provisions to be exchanged, was put into possession of an iron pot, and from that time he and his friends ate boiled meat every day. Several iron pots were likewise given to Obeera and some of the chiefs; which were in constant use, and drew every body to see them; but although the particulars of two successive voyages of captain Cook to this island are circumstantially related, we hear no more of this improvement in the culinary art, or of the further assistance which has been rendered those people in supplying them with pots for boiling; but however de-

fruous the natives might be to eat boiled meat, it was not advisable to have such an article of barter as iron kettles, when a few spike nails, or a common hatchet, would procure one of their largest hogs.

Salt water is the usual sauce to their food; those who live near the sea have it furnished as it is wanted, others at a distance keep it in large bamboos. The kernels of the cocoa-nuts furnish them with another sauce: these, made into a paste something of the consistence of butter, are beat up with salt water, which has a very strong flavour; but though at first it seemed very nauseous, yet when the taste became familiar, it was much relished.

Their general drink is water, or the milk of the cocoa-nut. They shewed in general an aversion to strong liquors; and whenever any one of them happened to drink too freely with any of the ship's company as to be intoxicated, he resolutely refused to taste any thing that was likely to produce the same effect again; but they have a plant which they call *ava ava*, from the root of which they procure a liquor which has an inebriating quality. Their manner of preparing this strong drink is as simple as it is disgusting to an European. Several of the people take some of the root, and chew it till it is soft and pulpy; they then spit it out into a platter or other vessel, every one into the same: into this general receptacle water is poured according to the quantity prepared. The juice thus diluted, is strained through some fibrous stuff like fine shavings, after which it is fit for drinking, and it is always prepared for present use: it has a pepperish taste; drinks flat, and rather insipid; and though it intoxicates, yet captain Cook saw but one instance where it had that effect, as the natives generally drink it with great moderation, and but little at a time. Sometimes they chew this root as Europeans do tobacco, and sometimes they will eat it wholly.

They eat alone, or at least only in company with a guest that happens to call in; and the men and women never sit down together to a meal: the shade of a spreading tree serves them for a parlour; broad leaves spread in great abundance serve for a table-cloth; and if a person of rank, he is attended by a number of servants who seat themselves round him; before he begins his meal, he washes his mouth and hands very clean, and repeats this several times whilst he is eating. The quantity of food which these people eat at a meal is prodigious. Captain Cook says, he has seen one man devour two or three fishes as big as a perch; three bread-fruits, each bigger than two hills; 14 or 15 plantains, or bananas, each six or seven inches long and four or five round, and near a quart of the pounded bread-fruit. Men of rank are constantly fed by their women; and one of the chiefs who dined on board the ships in 1769, shewed such reluctance to feed himself, that one of the servants was obliged to feed him to prevent his returning without his meal. In one of the excursions which the gentlemen of the ships made into the country in 1773, they arrived at a neat house, where a very fat man, who seemed to be a chief of the district, was loling on his wooden pillow; before him two servants were preparing his desert, by beating up with water some bread-fruit and bananas in a large wooden bowl, and mixing with it a quantity of ferment-

Otaheitee. ted four paste called *mahie*. While this was doing, a woman who sat down near him, crammed down his throat by handfuls the remains of a large baked fish, and several bread-fruits, which he swallowed with a voracious appetite; his countenance was the picture of phlegmatic insensibility, and seemed to testify that all his thoughts centered in the gratification of his appetite. He scarce deigned to look at the strangers; and a few monosyllables which he uttered, were extorted from him to remind his feeders of their duty, when by gazing at them they grew less attentive to him.

That these people, who are remarkably fond of society, and particularly that of their women, should exclude its pleasures from the table, where, among all other nations, whether civil or savage, they have been principally enjoyed, is truly inexplicable. How a meal, which every where else brings families and friends together, comes to separate them here, was a singularity much inquired about, but never accounted for. "They ate alone," they said, "because it was right;" but why it was right to eat alone, they never attempted to explain. Such, however, was the force of habit in this instance, as it is in every other, that they expressed the strongest dislike, and even disgust, at their visitants eating in society, especially with women, and of the same victuals. "At first (says captain Cook) we thought this strange singularity arose from some superstitious opinion; but they constantly affirmed the contrary. We observed also some caprices in the custom, for which we could as little account as the custom itself. We could never prevail with any of the women to partake of the victuals at our table, when we were dining in company; yet they would go five or six together into the servants apartments, and there eat very heartily of whatever they could find: nor were they in the least disconcerted if we came in while they were doing it. When any of us have been alone with a woman, she has sometimes eaten in our company; but then she has expressed the great unwillingness that it should be known, and always extorted the strongest promises of secrecy. Among themselves, even two brothers and two sisters have each their separate baskets of provisions, and the apparatus of their meal. When they first visited us at our tents, each brought his basket with him; and when we sat down to table, they would go out, sit down upon the ground, at two or three yards distance from each other, and turning their faces different ways take their repast without exchanging a single word. The women not only abstain from eating with the men, and of the same victuals, but even have their victuals separately prepared by boys kept for that purpose, who deposit it in a separate shed, and attend them with it at their meals. But though they would not eat with us, or with each other, they have often asked us to eat with them, when we have visited those with whom we were particularly acquainted at their houses; and we have often upon such occasions eaten out of the same basket, and drank out of the same cup. The elder women, however, always appeared offended at this liberty; and if we happened to touch their victuals, or even the basket that contained it, they would throw it away."

After meals, and in the heat of the day, the middle-aged people of the better sort generally sleep. They

are indeed extremely indolent; and sleeping and eating are almost all that they do. Those that are older are less drowsy, and the boys and girls are kept awake by the natural activity and sprightliness of their age.

These islanders, who inhabit huts exposed to all the winds, and hardly cover the earth, which serves them for a bed, with a layer of leaves, are remarkably healthy and vigorous, and live to an old age without enduring any of its infirmities; their fences are acute, and they retain their beautiful teeth to the last. M. de Bougainville describes an old man, whom they saw on their landing, who had no other character of old age, than that respectable one which is imprinted on a fine figure. His head was adorned with white hair, and a long white beard; all his body was nervous and fleshy; he had neither wrinkles, nor shewed any others tokens of decrepitude. This venerable man seemed displeased at the arrival of these strangers; he even retired without making any returns to the courtesies they paid to him; but he gave no signs either of fear, astonishment, or curiosity: very far from taking any part in the raptures which the multitude expressed, his thoughtful and suspicious air seemed to indicate, that he feared the arrival of a new race of men would interrupt the happiness he had so long enjoyed. From whence it may be inferred, that his mind was not a whit more impaired than his body. There are, however, several sorts of leprous complaints on this island, which appear in cutaneous eruptions of the scaly kind; some were seen that had ulcers upon different parts of their bodies: yet they seemed little regarded by those who were afflicted with them, and no application whatever was used to them, not so much as to keep off the flies. But instances of them are rare, as the excellency of their climate, and the simplicity of their vegetable food, prevent almost all dangerous and deadly disorders. They are sometimes afflicted with the cholera, and coughs are not unknown among them; and the chiefs, who fare more sumptuously, as a punishment for their voluptuousness are sometimes attacked with a disorder similar to the gout, in which the legs are swelled and excessively painful. M. de Bougainville's surgeon assured him, that he had seen many with marks of the small-pox.

The usual method employed here to restore the sick to health, is by pronouncing a set form of words; after which the exorcist applies the leaves of the cocoa-tree plaited, to the fingers and toes of the sick; so that nature is left to combat with the disease, without being assisted with any salutary application of art. But tho' they seem utterly destitute of medical knowledge, they appear to be no inconsiderable proficient in surgery, which they had an opportunity of proving while the Dolphin lay here. One of the seamen, when on shore, ran a large splinter into his foot; and the surgeon not being at hand, one of his comrades endeavoured to take it out with a pen-knife; but after putting the poor fellow to a great deal of pain, he was obliged to give it over: an old native, who had been very active and successful in establishing a good understanding between the ship's company and his countrymen, happening to be present, called a man from the other side of the river, who having examined the lacerated foot, fetched a shell from the beach, which he broke to a point with his teeth; with which instrument he laid

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open the wound, and extracted the splinter. Whilst this operation was performing, the old man went a little way into the wood, and returned with some gum, which he applied to the wound upon a piece of the cloth that was wrapped round him, and in two days time it was perfectly healed. This gum was produced by the apple-tree; the furgeon of the ship procured some of it, and used it as a vulnerary balsam with great success. Captain Cook, in 1769, saw many of the natives with dreadful scars; one man, in particular, whose face was almost entirely destroyed: his nose, including bone, was perfectly flat; and one cheek and one eye were so beaten in, that the hollow would almost receive a man's fist; yet no one ulcer remained.

The venereal disease is said to have been entailed upon these people by the crew of M. de Bougainville's ships, who visited this island a short time after Captain Wallis had left it. In 1769, more than one-half of the crew in Captain Cook's ship had contracted it, during a month's stay here. The natives distinguished it by a name of the same import with rotteness, but of a more extensive signification. They described, in the most pathetic terms, the sufferings which the first victims to its rage endured; and told him that it caused the hair and the nails to fall off, and the flesh to rot from the bones; that it spread an universal terror and consternation among the inhabitants, so that the sick were abandoned by their nearest relations, left the calamity should spread by contagion, and were left to perish alone in such misery as till then had never been known among them. But there seems to be some reason to hope that they had found out a specific cure for it, as none were seen on whom it had made a great progress; and one who went from the ship infected, returned, after a short time, in perfect health. Both Captain Cook and Mr Forster, in their relations of their voyage in the Resolution, endeavour to establish the opinion, that this scourge of licentiousness was felt in the South-Sea islands, previous to any of the modern voyages that have been made thither, and that it was an indigenous disease there. But if that conclusion is well founded, how comes it, that at all the places where the Resolution touched in 1773, which had been before visited by the Endeavour in 1769, such as New Zealand for instance, the crew, more or less, became infected by their commerce with the women, and not at all so at places which they visited, for the first time, in the Resolution?

30
Manufac-
tures.

The principal manufacture among the Otaheiteans is their cloth. This is made of the bark of trees, which are of three kinds, *viz.* the Chinese mulberry-tree, or *amata*; the bread-fruit tree, or *oroce*; and one that is described by Dr Hawkesworth as resembling the wild fig-tree of the West Indies. Of all these the paper mulberry affords the best cloth; what is made from that being both finer, softer, whiter, and better suited to take a colour; the *oroce* produces cloth much inferior in contexture; and the last is very coarse, in colour resembling the darkest brown paper; but this last is the only kind that withstands water. See the article BARK.—They likewise prepare a red dye; which is made by mixing the yellow juice of a small species of fig, which the natives call *mattee*, with the greenish juice of a sort of fern or bindweed, or of several other plants, which produce a

bright crimson; and this the women rub with their hands, if the piece is to be uniformly of a colour; or they make use of a bamboo reed if the piece is to be marked, or sprinkled into different patterns. The colour fades very soon, and becomes of a dirty red; but notwithstanding this defect, and its being liable to be spoiled by rain, the cloth thus stained is highly valued, and is worn only by the principal inhabitants of the country. The inhabitants perfume their clothes with certain plants; concerning which, Mr Forster made all possible inquiry. Tahea, a friendly native, shewed him several plants which are sometimes used as substitutes; but the most precious sort he either could not, or would not point out: and from the account of Omai it appears, that there are no less than 14 different sorts of plants employed for this purpose.

Matting is another Otaheitan manufacture; and in this they are so dextrous, that they produce finer mats than any made in Europe. Rushes, grass, the bark of trees, and the leaves of a plant called *wharrou*, are the materials which they work up for this purpose. Their matting is applied to various uses: the coarser kind is employed for sleeping on in the night, or sitting on through the day; the finer sort is converted into garments in rainy weather, their cloth being soon penetrated by wet. They are very dextrous in making basket and wicker-work: their baskets are of a vast number of different patterns, many of them exceedingly neat; and the making them is an art practised by every one, both men and women.

Instead of hemp, they make ropes and lines of the bark of a tree; and thus they are provided with fishing-nets; the fibres of the cocoa-nut furnish them with thread, with which they fasten the different parts of their canoes, &c. The bark of a nettle which grows in the mountains, and is called *orawa*, supplies them with excellent fishing-lines, capable of holding any kind of fish; and their hooks are made of mother-of-pearl, to which they fix a tuft of hair, made to resemble the tail of a fish. Instead of making them bearded, the point is turned inwards. They make also a kind of seine of a coarse broad grass, the bladder of which are like flags. These they twist and tie together in a loose manner, till the net, which is about as wide as a large sack, is from 60 to 80 fathoms long. This they haul in smooth shoal water; and its own weight keeps it so close to the ground, that scarcely a single fish can escape. They make harpoons of cane, and point them with hard wood; with which they can strike fish more effectually than an European can with one headed with iron.

The tools used by the Otaheiteans for all their purposes are, an adze, made of stone; a chisel or gouge, made of bone, generally the bone of a man's arm between the wrist and elbow; a rasp of coral, and the skin of a sting-ray; also coral and sand, as a file or polisher; and with these they fell timber, cleave and polish it, and hew stone. The stone which makes the blade of their adzes is a kind of basalt, of a grey or blackish colour; not very hard, but of considerable toughness: they are formed of different sizes; some that are intended for felling, weigh from six to eight pounds; others that are used for carving, not more than as many ounces: but it is necessary to sharpen these rude tools almost every minute; for which purpose a

11
Working-
tools.

cocoa-

Otaheite. cocoa-nut shell full of water and a stone are always at hand. With such tools they generally take up several days in felling a tree; but after it is down, and split into planks, they smooth them very dexterously and expeditiously with their adzes, and can take off a thin coat from a whole plank without missing a stroke.

12 Weapons. Their weapons are slings, which they use with great dexterity; pikes headed with the flings of fling-rays; and clubs of about six or seven feet long, made of a very hard wood. Thus armed, they are said to fight with great obliquity; and to give no quarter to man, woman, or child, who happens to fall into their hands during the battle, nor for some time afterwards, till their passion subsides. They have likewise bows and arrows; but the arrows are good for nothing except to bring down a bird, being headed only with stone, and none of them pointed. They have targets of a semi-circular form, made of wicker-work, and plaited strings of the cocoa-nut fibres, covered with glossy, bluish-green feathers belonging to a kind of pigeon, and ornamented with many shark's-teeth, arranged in three concentric circles.

13 Canoes. Their boats or canoes are of three different sorts. Some are made out of a single tree, and hold from two to six men. These are principally employed in fishing; the others are constructed of planks very dexterously sewed together; they are of different sizes, and will hold from 10 to 40 men: they generally lash two of these together, and set up two masts between them; or if they are single, they have an on-trigger on one side, and only one mast in the middle; and in these vessels they will sail far beyond the sight of land. The third sort seems to be principally designed for pleasure or shew. These are very large, but have no sail; and in shape resemble the gondolas of Venice. The middle is covered with a large awning; and some of the people sit upon it, and some under it. The plank of which these vessels are constructed, is made by splitting a tree, with the grain, into as many thin pieces as possible. The boards are brought to the thickness of about an inch, and are afterwards fitted to the boat with the same exactness that might be expected from an expert joiner. To fasten these planks together, holes are bored with a piece of bone fixed into a stick for that purpose. Through these holes a kind of plaited cordage is passed, so as to hold the planks strongly together. The seams are caulked with dry rushes; and the whole outside of the vessel is painted over with a kind of gummy juice, which supplies the place of pitch.

14 Character, manners, &c. The Otaheiteans are a very industrious people, and friendly in their dispositions; but, like all other nations not fully civilized, their passions are extremely violent, and they are very fickle. The manner of singling out a man here for a chosen friend is by taking off a part of your clothing and putting it upon him. Their usual manner of expressing their respect to strangers, or to their superiors, at a first meeting, is by uncovering themselves to the middle. They have a custom of saluting those who sneeze, by saying *evarecia-tatoua*, "May the good catoua awaken you," or "May not the evil catoua lull you asleep!"

Their propensity to theft is very great, inasmuch, that Mr Bougainville says, "even in Europe itself one cannot see more expert filchers than the people of this

country;" and indeed, in all the voyages made by Captain Cook and others, they had abundant experience of this disposition of the natives, which often produced quarrels, and sometimes even fatal effects. In their behaviour they are extremely lascivious, almost beyond credibility. A woman of distinction who visited Mr Banks used the following ceremony on her first approach to the stranger. After laying down several young plantain-leaves, a man brought a large bundle of cloth; which having opened, he spread it piece by piece on the ground, in the space between Mr Banks and his visitants. There were in all nine pieces: having spread three pieces one upon another, the lady came forward, and, stepping upon them, took up her garments all around her to her waist; she then turned three times round, after which she dropped the veil: when other three pieces were spread, she practised the same ceremony; and so the third time, when the last three pieces were laid out: after which the cloth was again rolled up, and delivered to Mr Banks as a present from the lady, who with her attending friend came up and saluted him. From the unbridled licentiousness of these people, the French gave this island the name of the *New Cythera*. Nay, to such a degree do they carry their libidinous excesses, that a number of the principal people, it is related, have formed themselves into a society, in which every woman is common to every man. This society is distinguished by the name of *Arreey*, the members of which have meetings from which all others are excluded. At these meetings the passions are excited by a studied course of sensuality, and the coarsest and most brutal pleasures are enjoyed by the whole company. If, however, notwithstanding these excesses, any of the female members of this community should prove with child, unless she can procure some man to adopt the child as his own, not all the strong affections of a mother, if such are not entirely eradicated by a course of life subversive of the feelings as well as the modesty of nature, can save the life of the precondemned innocent; but the child as soon as born is smothered, and the mother is left at liberty to renew her former course of execrable prostitution. Should any man be found to co-operate with a woman in saving the life of a child, they are both excluded for ever from the *arreey*, and are considered as man and wife. The woman from that time is distinguished by the term *whannow-nouw*, "the bearer of children;" which in this part of the world only is considered as a term of reproach; and so depraved are these people, that being a member of such a society is boasted of as being a privilege, instead of being stigmatised as the foulest crime. The *arreeys* enjoy several privileges, and are greatly respected throughout the Society Islands, as well as at Otaheite; nay, they claim a great share of honour from the circumstance of being childless. Tupia, one of the most intelligent natives, when he heard that the king of England had a numerous offspring, declared, that he thought himself much greater, because he belonged to the *arreeys*. That this society indulge themselves in promiscuous embraces, and that every woman is common to every man, is contradicted by Mr Forster. He says, that these *arreeys* choose their wives and mistresses from among the prostitutes; and from this circumstance, as well as their extreme voluptuousness, they

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they have seldom any reason to dread the intrusion of children. He had the following circumstances related to him by Omai or Omiah, one of the natives, who was brought to England. He said, that the pre-eminence and advantages which a man enjoyed as arceoy were so valuable, as to urge him against his own feelings to destroy his child; that the mother was never willing to consent to the murder; but that her husband and other arceoy's persuaded her to yield up the child; and that where intrigues were not sufficient, force was sometimes made use of. But above all, he added, that this action was always perpetrated in secret; inasmuch, that not even the *tomtous*, or attendants of the house were present; because, if it were seen, the murderers would be put to death.

Both men and women constantly wash their whole bodies three times a-day in running water, and are remarkably cleanly in their clothes. They are most expert swimmers, being accustomed to the water from their infancy. Captain Cook relates the following remarkable instance of their expertness. On a part of the shore where a tremendously high surf broke, inasmuch that no European boat could live in it, and the best European swimmer, he was persuaded, would have been drowned, as the shore was covered with pebbles and large stones, yet here were 10 or 12 Indians swimming for their amusement. Whenever a surf broke near them, they dived under it, and rose again on the other side. The stern of an old canoe added much to their support. This they took out before them, and swam with it as far as the outermost breach; when two or three getting into it, and turning the square end to the breaking wave, were driven in towards the shore with incredible rapidity, sometimes almost to the beach; but generally the wave broke over them before they got half way; in which case they dived, and rose to the other side with the canoe in their hands, and swimming out with it again, were again driven back. This amazing expertness drew the Captain's attention for more than half an hour; during which time none of the swimmers attempted to come ashore, but seemed to enjoy the sport in the highest degree. At another time, one of the officers of the quarter-deck intending to drop a bead into a canoe for a little boy of six years of age, it accidentally missed the boat, and fell into the sea; but the child immediately leaped overboard, dived after it, and recovered it. To reward him for this feat, some more beads were dropped to him; which excited a number of men and women to amuse the officers with their amazing feats of agility in the water, and not only fetched up several beads scattered at once, but likewise large nails, which, from their weight, descended quickly to a considerable depth. Some of these people continued a considerable time under water; and the velocity with which they were seen to go down, the water being extremely clear, was very surprising. Here a green branch of a tree is used as an emblem of peace, in exact conformity to the custom of the ancient nations.

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Language,
&c.

The language of these islanders is soft and melodious; it abounds with vowels, and the pronunciation of it is easily acquired; but it was found excessively difficult to teach the natives to pronounce a single English word; probably not only from its abounding with consonants, but from some peculiarity in its

structure; for Spanish and Italian words, if ending in a vowel, they pronounced with the greatest ease. A sufficient acquaintance has not been formed with it to determine whether it is copious or not; but it is certainly very imperfect, being totally without inflexion either of nouns or verbs. Few of the nouns have more than one case, and few of the verbs more than one tense. It was impossible to teach the islanders to pronounce the names of their guests. They called Captain Cook *Toot*; Mr Hicks, the first lieutenant *Hee*, &c. and in this manner they formed names for almost every man in the ship. In some, however, it was not easy to find any traces of the original; and they were perhaps not mere arbitrary sounds formed upon the occasion, but signified words in their own language; and it seems that they could perfectly remember these appellations at the distance of four years, by their inquiries after such gentlemen as were absent on the second voyage by name. Mr Monkhouse, a midshipman, they called *Matte*, which in their language signifies *dead*; because he commanded a party that killed a man for stealing a musket. The nearest imitation they could reach of king George, was by calling him *Kihiargo*.

A map of Otaheitee, engraved for Captain Cook's first voyage, was taken out, and laid before Tuahow the high admiral, without informing him of what it was; however, he immediately found it out, and was overjoyed to see a representation of his own country. He pointed out all the districts of it, naming every one of them in their order.

These people have a remarkable sagacity in foretelling the weather, particularly the quarter from whence the wind will blow. In their long voyages they steer by the sun in the day, and in the night by the stars; all of which they distinguish by separate names, and know in what part of the heavens they will appear in any of the months during which they are visible in their horizon. They also know the times of their annual appearing and disappearing, with more precision than would easily be believed by an European astronomer. Their time they seem to reckon by moons, 13 of which make a year. The day they divide into six parts, and the night into an equal number. They judge of the time of the day by the height of the sun, but they cannot ascertain the time of the night by the stars. In numeration, the greatest length they can go is 200; that is, when they have counted each of their fingers and toes ten times over. When they take the distance from one place to another, they express it by the distance which is required to pass it.

The government of the Otaheiteans seems greatly to resemble the early state of the European nations under the feudal system. Their orders of dignity are *earce-rabie*, which answers to king; *earce*, baron; *manabouni*, vassal; and *tomtous*, vassal. There are two kings in the island, one being the sovereign of each of the peninsulas of which it consists. Each of them is treated with great respect by all ranks, but does not appear to be invested with so much power as is exercised by the earces in their own districts. When the king, whom they called *O-Too*, made a visit to Captain Cook, the chiefs, who happened to be there before him, immediately stripped themselves in great haste. Captain Cook took notice of it, upon which they said *earce*, *earce*, signifying, that it was an account

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Govern-
ment.

Otaheite. count of O. Too being present: but this was the only outward token of respect they paid him; for they never rose from their seats, or made any other obeisance.

The *carrees* are lords of one or more of the districts into which each of the peninsulas is divided, and of which there are 43 in the larger one. These parcel out their territories to the *manabounis*, who superintend the cultivation of the ground. The lowest class, called *tau-tous*, seem to be nearly under the same circumstances with the vassals in feudal governments. They do all the laborious work, cultivate the land, catch fish, fetch wood and water, &c. Each of the *carrees* keeps a kind of court, and has a great number of attendants, chiefly the younger brothers of their own tribe; and among these some hold particular offices, but of which little more is known than some of their names.

In this country a child succeeds to his father's titles and authority as soon as he is born; and thus the king no sooner has a son born, than his sovereignty ceases. A regent is then chosen; and the father generally retains his power under that title, until his child becomes of age. The child of the baron succeeds to the titles and honours of his father as soon as it is born, as well as the son of the king; so that a baron who was yesterday called *carree*, and was approached with the ceremony of lowering the garments, so as to uncover the upper part of the body, is to-day, if his wife happens to be delivered of a child, reduced to the rank of a private man; all marks of respect being transferred to the child, if it is suffered to live, though the father still continues possessor and administrator of his estate. But the acquiescence which the lower class of people, or *taoutous*, yield to the command of their chiefs, is very remarkable. They are not suffered to taste any animal-food, although they are employed in feeding it for their lords. They endure patiently very severe blows, if, when collected into a large body, they in any manner press upon or annoy the king or a chief in his progress: and all this passive spirit is preferred without any power being lodged in the hands of the king to exact it; for he uses no military force, nor is even attended with body-guards.

There are but few actions which are reckoned crimes among the Otaheiteans. Adultery, however, is sometimes punished with death; but in general, the woman escapes with a severe beating, and the gallant passes unnoticed. The regulation of public justice is not confined to the magistrate; for the injured party redresses his own wrong by inflicting whatever punishment he can upon the offender: but in matters of notorious wrong, the chiefs sometimes interpose. The nobility have livery for their servants; and in proportion as the master's rank is more or less elevated, these falshes are worn higher or lower, being fastened close under the arms of the servants belonging to the chiefs, and going round the loins of those belonging to the lowest class of nobility. Several parts of the island seem to be private property, which descend to the heir of the possessor on his death, and the descent seems to fall indifferently on man or woman. Captain Cook was of opinion, that the number of inhabitants on the whole island amounted to 204,000, including women and children.

The religious language of the Otaheiteans, like that of the Gentoo Bramins, is different from what is used in common discourse; but, according to the accounts we have of their notions concerning the origin of the world, nothing can be more ridiculous. They imagine that the Supreme Deity, besides a great many female defendants, has one son named *Tane*; and to him they direct their worship, though they do not believe that the good or bad conduct of mankind here on earth makes them more or less acceptable to this divinity. They believe the existence of the soul after death, and of a greater or lesser degree of happiness to be then enjoyed; but they seem to have no conception of a state of punishment or of suffering hereafter. The share of happiness which they imagine every individual will enjoy in this future state, will be assigned to him according to the rank he holds on earth. We are not, however, told wherein they suppose the happiness of this future state to consist; but it is most probably a pretty exact imitation of a Mahomedan paradise, for these voluptuaries can hardly be supposed capable of imagining any pleasure independent of the intercourse of the sexes.

The priesthood seems to be hereditary in one family or tribe; and as it is said to be numerous, probably those of that order are restrained from becoming members of the Arroy: but whether or not any peculiar decorum is necessary to be observed, hath not yet appeared. These priests are professedly the men of science; but their knowledge is altogether frivolous and useless; for it consists in being conversant with the names of their different divinities, and such absurd traditions as have been handed down among them from one generation to another. Their religious notions being deposited in an unknown tongue, they are respected because they are not understood; and as the cure of the soul is no object of regard, the most important concern to these people, the cure of their bodies, is committed to the priests, and much parade is used in their attempts to recover the sick, though their remedies consist of ridiculous ceremonies and enchantments rather than anything else.

The marriages of these people are merely secular contracts: but no one has a right to perform the operation of tattooing, except the priests; and this being a custom universally adopted by the natives, it may be supposed, that the performing it is a very lucrative employment. The males in general undergo a kind of circumcision, which it is disgraceful not to comply with, and which is likewise the exclusive privilege of the priests to perform. But what most establishes the credit of this order of men is their skill in astronomy and navigation.

Captain Cook, who had some reason to believe that, among the religious customs of this people, human sacrifices were sometimes offered up to their deities, went to a morai, or place of worship, accompanied by Captain Furneaux, having with them a sailor who spoke the language tolerably well, and several of the natives. In the marai was a tupapow, a kind of bier, with a shed erected over it, on which lay a corpse and sums provisions. Captain Cook then asked if the plaintiff were for the Eatua? If they sacrificed to the Eatua hogs, dogs, fowls, &c.? To all of which an intelligent native answered in the affirmative. He then asked

Otaheitee. e1 If they sacrificed men to the Eatua? He was answered, *taato eno*, "bad men they did; first *tiparraby*, beating them till they were dead." He then asked if good men were put to death in this manner? His answer was no, only *taato eno*. The Captain then asked if any Earees were? The native replied, they had hogs to give the Eatua, and again repeated *taato eno*. He was then asked if towtows, who had no hogs, dogs, or fowls, but yet were good men, were ever sacrificed to the Eatua? The answer still was no, only bad men. Many other questions were put to him; all his answers to which seemed to confirm the ideas that men for certain crimes were condemned to be sacrificed to the gods, provided they did not possess any property which they might give for their redemption. However, in pursuing such inquiries as these, no certain information could be obtained, on account of the slight knowledge which had been acquired of the language of the country; but according to further accounts which Captain Cook received from Omai, it seems to rest with the high-priest to single out the victims for sacrifice; who, when the people are assembled on any solemn occasion, retires alone into the house of God, and stays there for some time; when he comes out, he informs the assembly that he has seen and conversed with the great god, (the high-priest alone having that privilege), and that he has asked for a human sacrifice; and tells them he has desired such a person, naming a man present, who has most probably, on some account or other, rendered himself obnoxious to this ghastly father. The words are no sooner gone out of his mouth, than the devoted wretch is put to death; for his guilt cannot be doubted, after the oracle has pronounced his doom.

On this island was seen the figure of a man constructed of basket-work, rudely made, but not ill designed: it was something more than seven feet high, and rather too bulky in proportion to its height. This wicker skeleton was completely covered with feathers, which were white where the skin was to appear, and black in the parts which it is their custom to paint or stain, as well as upon the head, which was designed to represent hair. Upon the head also were four protuberances; three in front, and one behind, which the Indians called *tate etc*, little men. The image was called *Manie*; it was a representation of *Mauve*, one of their Eatuas, or gods of the second class, and was said to be the only one of the kind on Otaheitee.

These people pray at sun-rise and sun-set. They have also a number of superstitious practices, in order to conciliate the influence of evil genii. E-Tee, a chief, who seemed to be the king's prime minister in 1774, very seriously asked Mr Forster whether they had a god (*Eatau*) in their country, and whether they prayed to him (*epooe*?) When he told them that they acknowledged a Divinity who had made every thing, and was invisible, and that they were accustomed to address their petitions to him, he seemed to be highly pleased, and repeated their words with comments of his own, to several persons who sat round him; seeming thereby to intimate, that the ideas of his countrymen corresponded with theirs in this respect.

Their marais are used both as burying-grounds and places of worship; they are approached with the most

wonderful expressions of reverence and humility; and this, it should seem, not because any there is esteemed sacred, but because they there worship an invisible being, for whom they entertain the most reverential respect, although not excited by the hope of reward, or the dread of punishment. Though they do not appear to have any visible object of worship, yet, says Captain Cook, this island, and indeed the rest that lie near it, have a particular bird, some a heron, and others a king-fisher, to which they pay a particular regard, and concerning which they have some superstitious notions, respecting good or bad fortune, as we have of the swallow and robin-redbreast, and will on no account molest or kill them. One of these cemeteries, or places of worship, was known to Captain Cook, on his first voyage, by the name of Tootahah's marai, then the regent; but when, on his second voyage, after the death of that chief, he called it by that name, Maratata, a chief that accompanied the party, interrupted him, intimating, that it was no longer Tootahah's after his death, but was then known as O-Too's marai, the then reigning prince. A fine moral for princes! daily reminding them of mortality whilst they live, and teaching them, that after death they cannot call even that ground their own which their dead corpse occupies! The chief and his wife, on passing by it, took their upper garments from their shoulders. From hence it should seem, that the royal family have a particular marai, and that it always bears the name of the reigning prince.

An Indian, who had snatched away a musket from a sentry whilst on duty, was, by the inhumanity of a midshipman who commanded the guard, pursued and shot. The unhappy fate of this poor fellow gave an opportunity for seeing the manner in which these people treat their dead. They placed the corpse in the open air till the bones became quite dry; a shed was erected close by the house where the deceased had resided; it was about 15 feet long, and eleven broad; one end was left quite open; the other end, and the two sides, were partly inclosed with a sort of wicker-work. The bier was a frame of wood, like that on which the sea-beds, called *cots*, are placed, with a matted bottom, and supported by four posts, at the height of about four feet from the ground. The body was covered first with a mat, and then with white cloth; by the side of it lay a wooden mace, one of their weapons of war; and near the head of it, which lay next to the close end of the shed, lay two cocoa-nut shells; at the other end a bunch of green leaves, with some dried twigs, all tied together, were stuck in the ground, by which lay a stone about as big as a cocoa-nut. Near these lay one of the young plantain-leaves that are used for emblems of peace, and close by it a stone ax. At the open end of the shed also hung, in several strings, a great number of a palm-nut; and without the shed was stuck up in the ground a stem of a plantain tree, about six feet high, upon the top of which was placed a cocoa-nut shell full of fresh water; against the side of one of the posts hung a small bag, containing a few pieces of bread-fruit ready roasted, which had not been put in all at one time, some being fresh, and others stale. This minute examination of their manner of treating their dead, seemed to be very unwelcome to the natives. The food so placed by the

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Funerals.

Otaheitee. corps is designed as an offering to their gods. They cast in, near the body, small pieces of cloth, on which the tears and blood of the mourners have been shed; for in their paroxysms of grief it is an universal custom to wound themselves with a shark's tooth. The mourner is always a man; and he is dressed in a very singular habit. When the bones are stripped of their flesh, and become dry, they are buried. This regard to their dead is very remarkable: one of the ship's company happening to pull a flower from a tree which grew on one of their sepulchral inclosures, an Indian came suddenly behind him and struck him; and a party of sailors, who were sent to get some stones for ballast for the ship, had like to have been embroiled with the natives, by pulling down some part of an inclosure of this kind. The shade under which their dead are laid is called *tupapow*; the inclosure in which their bones are deposited is called *morai*; these latter, as has been already related, are also places of worship. As soon as a native of Otaheitee is known to be dead, the house is filled with relations, who deplore their loss; some by loud lamentations, and some by less clamorous, but more genuine expressions of grief. Those who are in the nearest degree of kindred, and are really affected by the event, are silent; the rest, are one moment uttering passionate exclamations in a chorus, and the next laughing and talking without the least appearance of concern. In this manner the remainder of the day on which they assemble is spent, and all the succeeding night. On the next morning the body is shrouded in their cloth, and conveyed to the sea-side on a bier, which the bearers support upon their shoulders, attended by the priest, who having prayed over the body repeats his sentences during the procession. When it arrives at the water's edge, it is set down upon the beach; the priest renews his prayers, and taking up some of the water in his hands, sprinkles it towards the body, but not upon it. It is then carried back 40 or 50 yards; and soon after brought again to the beach, where the prayers and sprinkling are repeated. It is thus removed backwards and forwards several times; and while these ceremonies have been performing, a house has been built, and a small space of ground railed in. In the centre of this house, or *tupapow*, as they term it, posts are set up to support the bier, which is at length conveyed thither, and placed upon it; and here the body remains to putrify, till the flesh is wholly wasted from the bones. These houses of corruption are of a size proportioned to the rank of the person whose body they are to contain. Those allotted to the lower class are just sufficient to cover the bier, and have no railing round them. The largest that was seen was 11 yards long; and such are ornamented according to the abilities and inclination of the surviving kindred, who never fail to lay a profusion of good cloth about the body, and sometimes almost cover the outside of the house. Garlands of the fruit of the palm-nut, or pandanus, and cocoa-leaves, twisted by the priests in mysterious knots, with a plant called by them *ethee no morai*, which is particularly consecrated to funeral solemnities, are deposited about the place; provision and water are also left at a little distance. As soon as the body is deposited in the *tupapow*, the mourning is renewed. The women assemble, and are led to the door by the nearest relation, who strikes a

shark's tooth several times into the crown of her head; the blood copiously follows, and is carefully received upon pieces of linen, which are thrown under the bier. The rest of the women follow this example; and the ceremony is repeated at the interval of two or three days, as long as the zeal and sorrow of the parties hold out. The tears also which are shed upon these occasions, are received upon pieces of cloth, and offered as oblations to the dead. Some of the younger people cut off their hair, and that is thrown under the bier with the other offerings. This custom is founded on a notion, that the soul of the deceased, which they believe to exist in a separate state, is hovering about the place where the body is deposited; that it observes the actions of the survivors, and is gratified by such testimonies of their affectionate grief. Whilst these ceremonies are carrying on by the women, the men seem to be wholly insensible of their loss; but two or three days after, they also begin to perform a part. The nearest relations take it in turn to assume the dress, and perform the offices.

The chief mourner carries in his hand a long flat stick, the edge of which is set with shark's teeth; and in a phrenzy, which his grief is supposed to have inspired, he runs at all he fees, and if any of them happen to be overtaken, he strikes them most unmercifully with his indented cudgel, which cannot fail to wound them in a dangerous manner. The processions continue at certain intervals for five moons; but are less and less frequent, by a gradual diminution, as the end of that time approaches. When it is expired, what remains of the body is taken down from the bier; and the bones, having been scraped and washed very clean, are buried according to the rank of the person, either within or without a *morai*. If the deceased was an earce, or chief, his skull is not buried with the rest of his bones, but is wrapped up in fine cloth, and put in a kind of box made for that purpose, which is also placed in the *morai*. This coffin is called *ewharre no te orometua*, "the house of a teacher, or master." After this the mourning ceases, except some of the women continue to be really afflicted at the loss, and in that case they will suddenly wound themselves with the shark's tooth wherever they happen to be. The ceremonies, however, do not cease with the mourning; for prayers are still paid by the priest, and offerings made at the *morai*. Some of the things, which from time to time are deposited there, are emblematical: a young plantain is said to represent the deceased, and a bunch of feathers the Deity who is invoked. The priest places himself over against the symbol of the god, accompanied by some of the relations, who are furnished with a small offering: he repeats his orison in a set form, consisting of separate sentences; at the same time weaving the leaves of the cocconut into different forms, which he afterwards deposits upon the ground where the bones have been interred: the Deity is then addressed by a shrill scream, which is used only upon that occasion. When the priest retires, the tuft of feathers is removed, and the provisions are left to putrify, or be devoured by the rats.

This ceremony of mourning, as described above, was performed by Tiropo, one of the wives of Tubourai Tamaide; who, when the bleeding from the wounds which she had thus given herself ceased, looked up

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with a smile on the company round her, and who had before inquired of her, very earnestly, the cause of her behaviour, without receiving any answer, or having been at all noticed by her. She then began to pick up some small pieces of cloth which she had spread to catch the blood; and having got them all together, she went to the shore, and threw them into the sea. She then plunged into the river; and having washed her whole body, returned to the company as cheerful as ever. To add to the singularity of this conduct, the Indians who stood round her all the time that this frantic distress was performing, conversed with great indifference and jocularity.

There is not a more ancient custom handed down to us than that of cutting the body to express grief and distress of mind. In the code of laws delivered by Moses to the Israelites, 1400 years before the Christian æra, this practice is expressly forbidden to that people: "Ye shall not cut yourselves, or make any baldness between the eyes for the dead," Deut. xiv. 1. Hence it may be supposed that this rite prevailed in Egypt, from whence the Jews derived most of those propensities which were inhibited by their great legislator. We are told likewise in the book of Kings, of the priests of Baal wounding themselves, after they had long waited in vain for the supernatural intervention of their idol. D'Arvieux informs us, that the modern Arabs retain the same custom, and that the part they chiefly wound is their arms. The difference in the practice as now prevailing in O-Taheitee and Arabia seems to be, that in the first none but the women make use of it, and in the latter it is confined to the men, and generally used to express their desperate passion for some favourite mistress.

The mourning which is worn here is an head-dress of feathers, the colour of which is consecrated to death, and a veil over the face. This dress is called *ceeva*. The whole nation is said to appear thus on the death of their king. The mourning for fathers is very long. The women mourn for their husbands, but not the husbands for their wives.

We shall conclude this account of Otaheitee with the history of *Onai*, or as he is improperly called *O-miah*, who was brought over to England. He was a native of Ulitea, or Raiatea; and embarked at Huahine with Captain Furneaux, on board the adventure, in September 1773; and the two ships separating in a storm on the coast of New-Zealand a few months afterwards, the voyage of the Adventure was brought to a much earlier conclusion than that of the Resolution, for she arrived at Spithead the 14th of July following. This youth is said to have had some property in his native soil, of which he was dispossessed by the people of Bolabola; but he was not one of the eases, or gentry of that country, but of the middling class of people. He was eminent neither for figure, shape, nor complexion; his colour being of a deep hue, resembling a towrow, or one of the common people; and both Captain Cook and Mr Forster agree in thinking him no proper sample of the inhabitants of those islands, in respect to personal beauty. However, they are both of opinion, that the qualities of his heart and head resembled those of his countrymen in general, and that no one of the natives would have given more general satisfaction by his behaviour whilst

he remained in England. He is described as possessing a good understanding, quick parts, and honest principles: not an extraordinary genius like Tupia; yet not at all deficient in intelligence, which appears from his knowledge of the game of chess, in which he made an amazing proficiency. His principal patrons, whilst in England, were, the earl of Sandwich, Mr Banks, and Doctor Solander. His noble patron introduced him to his Majesty at Kew; and, during his stay in England, he was caressed by many of the principal nobility. He naturally imitated that easy and elegant politeness which is prevalent among the great, and which is one of the ornaments of civilized society. Indeed he adopted the manners, the occupations, and amusements of his companions in general, and gave many proofs of a quick perception, and a lively fancy. He appears, however, to have been treated, whilst he resided here, rather as a fashionable exhibition, than as a rational being. No attention seems to have been paid to the enriching his mind with useful knowledge, such as might have rendered him a valuable acquisition to his country on his return thither; no means were used to instruct him in agriculture, or any mechanical art or useful manufacture; and, above all, to possess him with a moral sense; to teach him the exalted ideas of virtue, and the sublime principles of revealed religion. After a stay of two years in England, and having been inoculated for the small-pox, he embarked with Captain Cook, on board the Resolution, on his return home, loaded with a profusion of presents. At parting with his friends here, his tears flowed plentifully, and his whole behaviour bespoke him to be sincerely affected at the separation: but though he lived in the midst of amusements during his residence in England, his return to his native country was always in his thoughts; and tho' he was not impatient to go, he expressed a satisfaction as the time of his return approached.

OTALGIA, the EAR-ACH, in medicine. See there n° 314. and p. 4869.

OTIS, in ornithology, a genus of birds belonging to the order of grallæ. There are four species, principally distinguished by their colour. One of the species, the tarda, or bustard, is the largest of the British land-fowl; the male at a medium weighing 25 pounds; there are instances of some very old ones weighing 27. The breadth nine feet; the length near four. Besides the size and difference of colour, the male is distinguished from the female by a tuft of feathers about five inches long on each side of the lower mandible. Its head and neck are ash-coloured: the back is barred transversely with black and bright rust-colour: the greater quill-feathers are black: the belly white: the tail is marked with broad red and black bars, and consists of twenty feathers: the legs dusky.

The female is about half the size of the male: the crown of the head is of a deep orange, traversed with black lines; the rest of the head is brown. The lower part of the fore-side of the neck is ash-coloured: in other respects it resembles the male, only the colours of the back and wings are far more dull.

These birds inhabit most of the open countries of the south and east parts of this island, from Dorsetshire, as far as the Wolds in Yorkshire. They are exceeding

Otaheitee

Otis,

Otranto
Otway.

Oval
Overbury.

Plate
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exceeding shy, and difficult to be shot; run very fast, and when on the wing can fly, though slowly, many miles without resting. It is said that they take flight with difficulty, and are sometimes run down with grehounds. They keep near their old haunts, seldom wandering above 20 or 30 miles. Their food is corn and other vegetables, and those large earth-worms that appear in great quantities on the Downs before sun-rising in the summer. These are replete with moisture, answer the purpose of liquids, and enable them to live long without drinking on those extensive and dry tracts. Besides this, nature hath given the males an admirable magazine for their security against draught, being a pouch, whose entrance lies immediately under the tongue, and which is capable of holding near seven quarts; and this they probably fill with water, to supply the hen when sitting, or the young before they can fly. Bustards lay only two eggs, of the size of those of a goose, of a pale olive-brown, marked with spots of a dark colour; they make no nest, only scrape a hole in the ground. In autumn they are (in Wiltshire) generally found in large turnep-fields near the Downs, and in flocks of 50 or more.

OTRANTO, or TERRA D'OTRANTO, a province of Italy in the kingdom of Naples; bounded on the north by the Terra di Bari and by the gulph of Venice, on the east by the same gulph, and on the south and west by a great bay which is between that and the Basilicata. It is a mountainous country, abounding in figs, olives, and wine. It is often visited by locusts, and by Algerine pirates, who carry off all the people they can catch into slavery. But to keep them off, there are a great many forts on the coasts.

OTRANTO, a city of Italy, in the kingdom of Naples, and capital of the province of the same name, with a commodious harbour, an archbishop's see, and a strong citadel where the archbishop resides. It was taken by the Turks in 1480, who did a great deal of mischief; and it has frequently suffered much from the Algerines. It is a large handsome place, seated on the gulph of Venice, in E. Long. 18. 35. N. Lat. 40. 21.

OTWAY (Thomas) an eminent tragic poet, was the son of Mr Humphry Otway, rector of Wolbeding in Suffex; and was born at Trotton in that county, on the 3d of March 1651. He was educated at Oxford; when, leaving the university without a degree, he retired to London, where he commenced player, but with indifferent success. However, the sprightliness of his conversation gained him the favour of Charles Fitz-Charles earl of Plymouth, who procured him a cornet's commission in one of the new-raised regiments sent into Flanders; but he returned from thence in very necessitous circumstances, and applied himself again to writing for the stage. In comedy he has been deemed too licentious; which, however, was no great objection to his pieces in the profligate days of Charles II. But, in tragedy, few English poets have ever equalled him; and perhaps none ever excelled him in touching the passions, particularly the tender passion. There is generally something familiar and domestic in the fable of his tragedies, and there is amazing energy in his expression.—The heart that doth not melt at

the distresses of his Orphan must be hard indeed! But though Otway possessed in so eminent a degree the rare talent of writing to the heart, yet he was not very favourably regarded by some of his contemporary poets, nor was he always successful in his dramatic compositions. After experiencing many reverses of fortune in regard to his circumstances, but generally changing for the worse, he at last died wretchedly in a public house on Tower-hill; whither, it is supposed, he had retired in order to avoid the pressure of his creditors. Some have said, that down-right hunger compelling him to fall too eagerly on a piece of bread, of which he had been for some time in want, the first mouthful choked him, and instantly put a period to his days.—His dramatic writings are nine in number; the most admired of which are, *The Orphan*, and *Venice Preserved*. He had also made some translations, and wrote several miscellaneous poems. His whole works are printed in two pocket-volumes.

OVAL, an oblong curvilinear figure, otherwise called *ellipsis*. See *ELLIPSIS*. However, the proper oval, or egg-shape, differs considerably from that of the ellipsis, being an irregular figure, narrower at one end than at another; whereas the ellipsis, or mathematical oval, is equally broad at each end; though, it must be owned, these two are commonly confounded together; even geometers calling the oval a *false ellipsis*.

OVARY, in anatomy, that part of a female animal wherein the ova or eggs are formed or lodged. See *ANATOMY*, n° 372, m.

OVARIUM, in botany, a name by which botanists, who are fond of assimilating the animal and vegetable kingdoms, have distinguished the germen or seed-bud, as containing the rudiments of the future seed.

OVATION, in the Roman antiquity, a lesser triumph, allowed to commanders for victories won without the effusion of blood; or for defeating a mean and inconsiderable enemy. The show generally began at the Albanian mountain, whence the general with his retinue made his entry into the city on foot, with many flutes or pipes sounding in concert as he passed along, and wearing a garland of myrtle as a token of peace. The term ovation, according to Servius, is derived from *ovis*, a sheep; because on this occasion the conqueror sacrificed a sheep, as in triumph he sacrificed a bull.

OUDENARDE, a rich and strong town of Austrian Flanders, in the middle of which there is a considerable fort. The river Scheld runs across this place with its environs, whose soil is very fertile, and forms a considerable chattellany. They have here a manufacture of very fine linen and curious tapestry. This town was besieged by the French in 1708; but they were obliged to raise the siege by the duke of Marlborough and prince Eugene, who entirely defeated their army, killing 3000 on the spot, and taking 7000 prisoners. E. Long. 3. 42. N. Lat. 50. 49.

OVERBURY (Sir Thomas), a learned and worthy English gentleman, was born in 1581; and studied at Queen's college, Oxford, after which he removed to the Middle-temple London. He afterwards travelled for some time, and returned a most accomplished person;

Overbury. son; when he contracted an intimate acquaintance with Sir Robert Carr, knight of the bath, who being soon after taken into his majesty's favour, had Mr Overbury knighted at Greenwich. Sir Thomas perceiving the familiarity which subsisted between his patron Carr, now made viscount Rochester, and the lady Frances, the wife of Robert earl of Essex, was so much displeased at it, that he endeavoured to dissuade him from keeping her company, and from proceeding in the base design he had formed of having her first divorced from her husband, and then marrying her. The viscount, respecting this honest advice, told what he had said to the lady, who was as remarkable for her wickedness as for her beauty; on which they immediately resolved on his destruction. About this time, the king wanting to send an ambassador abroad, the viscount recommended Sir Thomas Overbury. His majesty approving the choice, the viscount imparted the king's intentions to Sir Thomas; but, under a treacherous shew of friendship, dissuaded him from accepting of that employment, as it might hinder him from a better way of advancement; promising that he would prevent his majesty from being displeased at his refusal. The viscount then went to the king, and artfully incensing his majesty against Sir Thomas for refusing to obey his commands, that gentleman was committed to the tower for his contempt, on the 21st of April 1613, where he continued till he was dispatched by poison on the 15th of September following, and his body was interred in the tower-chapel the same day. About two years after, the whole contrivance of his death was discovered. On this several persons were condemned and executed; but tho' Carr, earl of Somerset, and the lady Frances his countess, were condemned to death for contriving the murder, and hiring the persons who were concerned in it, the king only banished them from court, and afterwards pardoned them. Sir Thomas Overbury wrote several poems, &c. and an account his travels.

OVEN, a kind of domestic furnace, used for baking bread, pies, tarts, &c. of a circular structure, with a very low roof, well lined, both on the top, bottom, and sides, with stone; it has a small entrance in the front, which is exactly fitted by a kind of door, which being clapped to the mouth of the oven confines the heat, while bread, pies, or puddings, are baking. Over this, pastry-cooks, &c. have another oven built much in the same manner, which is used for such things as require a less degree of heat. Ovens are heated by burning dry wood, faggots, &c. in them, till all the parts are equally hot.

OVER-HAULING, the act of opening and extending the several parts of a tackle, or other assemblage of ropes, communicating with blocks or dead-eyes. It is used to remove those blocks to a sufficient distance from each other, that they may be again placed in a state of action, so as to produce the effect required.

OVER-Hauling, is also vulgarly exprest of an examination or inspection into the condition of a person or thing.

OVER-Rake, among seamen: When a ship riding at anchor is overbeaten herself into an high sea, that she is washed by the waves breaking in upon her, they say the waves over-rake her.

OVER-Reach, in farriery. See there, § xl. 2.

OVERSMAN, in Scots law, a person appointed by arbiters, or by the parties submitters, to determine the matter submitted, in case the parties disagree in their opinion.

OVERT, the same with "open;" thus an overt act signifies an act which, in law, must be clearly proved; and such is to be alleged in every indictment for high treason.

OVERTURE, or **OVERTURE,** opening or prelude; a term used for the solemnities at the beginning of a public act or ceremony; an opera, tragedy, comedy, concert of music, &c.—The overture of the theatre or scene, is a piece of music usually ending with a fugue; the overture of a jubilee is a general procession, &c.

OVERYSSEL, one of the Seven United Provinces; bounded on the east by the bishopric of Munster, on the north by Friesland and the territory of Groningen, on the west by the river Yssel, and on the south by the county of Zutphen and the bishopric of Munster. It is divided into three distinct parts; which are, the territories of Drenfe, Twente, and Salland. There are many morasses in this province, and but few inhabitants, in comparison of the rest. Its greatest riches consist in turfs; which are dug up here, and sent to the neighbouring provinces, particularly Holland.

OVIEDO, a town of Spain, and capital of Asturias d'Oviedo, with a bishop's see, and an university; situated at the confluence of the rivers Ove and Deva, which form the Asta, 50 miles north-west of Leon, and 208 north-west of Madrid. W. Long. 5. 47. N. Lat. 43. 23.

OUGHTRED (William), an eminent mathematician, was born at Eton in 1573, and educated in the school there, whence he was elected to king's college in Cambridge, of which he afterwards became fellow. Having received holy orders, he left the university about the year 1603, and was presented to the rectory of Aldbury, near Guildford in Surry; and about the year 1628, was appointed by the earl of Arundel to instruct his son in the mathematics. He kept a correspondence by letters with some of the most eminent scholars of his time, upon mathematical subjects; and the most celebrated mathematicians of that age owed most of their skill to him, whose house was full of young gentlemen that came from all parts to receive his instruction. It is said, that, upon hearing the news of the vote at Westminster for the restoration of king Charles II. he expired in a sudden transport of joy, aged 88. He wrote, 1. *Clavis Mathematica*; which was afterwards published in English. 2. A description of the double horizontal dial. 3. *Opuscula Mathematica*; and several other works. He left also behind him a great number of papers upon mathematical subjects, which are now in the museum of William Jones, Esq; F. R. S.

OVID, or **Publius Ovidius Naso**, a celebrated Latin poet of the Augustan age, was a Roman knight, born at Sulmo, in the 43^d year before the Christian æra. He studied rhetoric under Arelius Fuscus, and for some time frequented the bar; but was afterwards disgusted with that study, and applied himself entirely to poetry. Ovid, after having obtained the esteem of Augustus, incurred his displeasure; and was banished

Over
J. Ovid.

Ovilis
Ovis.

to Tomos, a city on the Pontus Euxinus, near the mouth of the Danube, when he was 50 years of age. Several writers have said that he was banished for being one of the lovers of Julia the daughter of Augustus, whom, according to them, he mentions under the name of *Corinna*; but Aldus Minutius has plainly refuted this notion. Ovid himself says, that his being sent into exile was occasioned by the licentiousness of his verses, and his having seen by accident and involuntarily something which he ought not to have seen. He in vain made use of all the turns of his wit to appease the emperor; but not all his addresses could procure his being again received into favour. He died in the country of the Getae, aged 57, after having spent seven years in his banishment. His works and their character are well known.

OVILIA, or **SEPTA**, in ancient Rome, a place in the Campus Martius, at first railed in like a sheep-pen, whence its name. Afterwards it was mounted with marble, and beautified with walks and galleries, as also with a tribunal, or seat of justice. Within this precinct or inclosure, the people were called to give their suffrages for the election of magistrates. The ascent into the ovilia was not by stairs, but by pontes, or narrow boards, laid there for the occasion; on which account *de ponte desici*, signified "to be deprived of the privilege of voting;" and persons thus dealt with were called *deponsati*.

OVIPAROUS, a term applied to such animals as bring forth their young from eggs; as birds, insects, &c.

OVIS, the **SHEEP**, in zoology, a genus of the mammalia class, and of the order of pecora; the characters of which are these: The horns are concave, turned backwards, and full of wrinkles; there are eight fore-teeth in the under-jaw, and no dog-teeth. The species are,

1. *Aries*, or ram and ewe, the horns of which are shaped like a half-moon, and compressed.

The sheep, unquestionably a mild and gentle creature, is also represented by Buffon as the most stupid, defenceless, and timid of all quadrupeds; inasmuch that, without the assistance of man, it could never, he thinks, have subsisted or continued its species in a wild state.

"The female is absolutely devoid of every art and of every mean of defence. The arms of the ram are feeble and awkward. His courage is only a kind of petulance, which is useless to himself, incommensurable to his neighbours, and is totally destroyed by castration. The wedder is still more timid than the sheep. It is fear alone that makes sheep so frequently assemble in troops: upon the smallest unusual noise, they run close together; and these alarms are always accompanied with the greatest stupidity. They know not how to fly from danger, and seem not even to be conscious of the hazard and inconvenience of their situation. Wherever they are, there they remain obstinately fixed; and neither rain nor snow can make them quit their station. To force them to move or to change their route, they must be provided with a chief, who is learned to begin the march: the motions of this chief are followed, step by step, by the rest of the flock. But the chief himself would also continue immovable, if he were not pushed off by the shepherd,

or by his dog, an animal which perpetually watches over their safety, which defends, directs, separates, assembles, and, in a word, communicates to them every movement necessary to their preservation.

"Of all quadrupeds, therefore, sheep are the most stupid, and derive the smallest resources from instinct. The goat, who so greatly resembles the sheep in other respects, is endowed with much more sagacity. He knows how to conduct himself on every emergency: he avoids danger with dexterity, and is easily reconciled to new objects. But the sheep knows neither how to fly nor to attack: however imminent her danger, she comes not to man for assistance, but willingly as the goat; and, to complete the picture of timidity and want of sentiment, she allows her lamb to be carried off, without attempting to defend it, or showing any marks of resentment. Her grief is not even expressed by any cry different from that of ordinary bleating."

But the annotator upon this article in the Edinburgh translation of Buffon, denies the above to be the natural character of the animal. "All tame animals," he observes, "lose a portion of that sagacity, dexterity, and courage, which they are obliged to employ against their enemies in a wild state; because they have been long accustomed to rely upon the protection of man. Sheep, when enslaved by men, tremble at the voice of the shepherd or his dog. But, on those extensive mountains where they are allowed to range without controul, and where they seldom depend on the aid of the shepherd, they assume a very different mode of behaviour. In this situation, a ram or a wedder boldly attacks a single dog, and often comes off victorious. But when the danger is of a more alarming nature, like man, they trust not to the prowess of individuals, but have recourse to the collected strength of the whole flock. On such occasions, they draw up into one compact body; they place the young and the females in the centre; and the strongest males take the foremost ranks, keeping close by each others sides. Thus an armed front is presented on all quarters, and cannot be attacked without the greatest hazard of destruction. In this manner they wait, with firmness and intrepidity, the approach of the enemy. Nor does their courage fail them in the moment of attack. For, if the aggressor advances within a few yards of the line, the ram darts upon him with such impetuosity, as lays him dead at their feet, unless he saves himself by flight. Against the attacks of single dogs, or foxes, they are, when in this situation, perfectly secure. Besides, a ram, regardless of danger, often engages a bull, and never fails to conquer him; for the bull, by lowering his head, without being sensible of his defenceless condition, receives between his horns the stroke of the ram, which usually brings him to the ground."

"In the selection of food, few animals discover greater sagacity than the sheep; nor does any domestic animal show more dexterity and cunning in its attempts to elude the vigilance of the shepherd, and to steal such delicacies as are agreeable to its palate. When perfectly tamed, and rendered domestic, the sportive gambols and troublesome tricks of the animal, are too well known to require any description."

As to the accusations contained in the latter part of the

Ovis.

Ibid. p. 464.
notes.Buffon's
Nat. Hist.
Vol. III.
p. 463.

Ovis. the character above quoted; every person, it is observed, who has attended to those animals, at least in this country, must know that they are not altogether just.

Phil. p. 466. "Individuals in a state of subjection, seem to have no idea of resisting the attacks of an enemy. But they soon learn that their protection lies in the shepherd or his dog: for, when it becomes necessary, in Britain, to watch the folds, in order to prevent assaults from foxes or dogs, upon the first alarm the whole flock run with violence to the place where the watchmen are stationed; so that, when they chance to sleep, they are often hurt by the sheep trampling upon them. On other occasions, they never choose to make a very close approach either to men or dogs; but the sense of immediate danger makes them forget their usual timidity, and their sagacity teaches them where their safety lies. When the female is robbed of her lamb, she bleats in a manner that strongly marks the anguish she feels. In the eagerness of her search, her eye-balls seem to start from their sockets; and her irregular and distracted motions, joined to the violence and constancy of her bleatings, are evident indications of the most puxigent grief."

But whatever may be its manners or its mental qualities, this animal is of the most extensive utility to man. We are clothed by its fleece. The flesh is a delicate and wholesome food. The skin, dressed, forms different parts of our apparel; and is used for covers of books. The entrails, properly prepared and twisted, serve for strings for various musical instruments. The bones calcined (like other bones in general), form materials for tests for the refiner. The milk is thicker than that of cows, and consequently yields a greater quantity of butter and cheese; and in some places is so rich, that it will not produce the cheese without a mixture of water to make it part from the whey. The dung is a remarkably rich manure; inasmuch that the folding of sheep is become too useful a branch of husbandry for the farmer to neglect. Nature, in short, has given this animal nothing that does not redound to our benefit.

The ram is capable of generation at the age of 18 months; and the ewe can be impregnated when a year old. One ram is sufficient for 40 or 40 ewes. He ought to be large and well proportioned; his head should be thick and strong, his front wide, his eyes black, his nose flat, his neck thick, his body long and tall, his testicles massy, and his tail long. White is the best colour for a ram. The ewes whose wool is most plentiful, bushy, long, soft, and white, are most proper for breeders, especially when at the same time they are of a large size, have a thick neck, and move nimbly.

In this climate ewes fed in good pastures admit the ram in July or August; but September or October are the months when the greatest part of our ewes, if left to nature, take the ram. They go with young about five months, and generally bring forth but one at a time, though frequently two: in warm climates, they may bring forth twice in a year; but in Britain, France, and most parts of Europe, only once. They give milk plentifully for seven or eight months. They live from 10 to 12 years: they are capable of bringing forth as long as they live, when properly managed; but are generally old and useless at the age of se-

ven or eight years. The ram, who lives 12 or 14 years, becomes unfit for propagating when eight years old.

Ovis,
Ounce.

When the male lambs are not intended to be kept for propagation, but fattened for food, they ought to be castrated at the age of five or six months. This operation is performed two ways: in the one, an incision is made, and the testicles taken out; in the other, a ligature is tied tight round the scrotum, above the testicles, which soon destroys the vessels which nourish them. After castration they are called *wedders*.

The ram, ewe, and wedder, when one year old, lose the two foreteeth of the under jaw; six months afterwards, they lose the two foreteeth next to these; and at the age of three years, the teeth are all replaced. The age of a ram may likewise be discovered by their horns, which always appear the first year, and frequently as soon as they are brought forth. These horns uniformly acquire an additional ring every year, as long as the creature lives. The ewes commonly have no horns, but a kind of long protuberances in place of them: however, some of them have two, and some four horns.

In Spain, and the southern parts of Europe, the flocks are kept in shades or stables during the night; but in Britain, where there is now no danger from wolves, they are allowed to remain without, both night and day; which makes the animals more healthy, and their flesh a more wholesome food. Dry and mountainous grounds, where thyme and sheep's fescue grass abound, are the best for the pasturing sheep.

The sheep is subject to many diseases: some arise from insects which deposit their eggs in different parts of the animal: others are caused by their being kept in wet pastures; for as the sheep requires but little drink, it is naturally fond of a dry soil. The dropsy, vertigo, (the *pendro* of the Welsh), the phthisis, jaundice, and worms in the liver, annually make great havoc among our flocks: for the first disease, the shepherd finds a remedy by turning the infected into fields of broom; which plant has been also found to be very efficacious in the same disorder among the human species.—The sheep is also infested by different sorts of insects: like the horse, it has its peculiar oestrus or gadfly, which deposits its eggs above the nose in the frontal sinuses; when those turn into maggots, they become excessive painful, and cause those violent agitations that we so often see the animal in. The French shepherds make a common practice of easing the sheep, by trepanning and taking out the maggot; this practice is sometimes used by the English shepherds, but not always with the same success. Besides these insects, the sheep is troubled with a kind of tick and louse, which magpies and starlings contribute to ease it of, by lighting on its back, and picking the insects off.

2. The guineensis, or Guinea sheep, has pendulous ears, lax hairy dewlaps, and a prominence on the hind part of the head. The wool is short, like that of a goat. It is a native of Guinea.

3. The strepticerus, or Cretan sheep, has frait carinated horns, twisted in a spiral manner. It is a native of mount Iola.

OUNCE, a little weight, the 16th part of a pound avoirdupois, and the 12th part of a pound Troy. The word

Ounce
Owen.

word is derived from the Latin, *uncia*, "the twelfth part of any whole," called *as*; particularly in geometrical measures, an inch, or the 12th part of a foot. See INCH and AS.

OUNCE, in zoology. See LEO.

OVOLO, or OVUM, in architecture, a round moulding, whose profile, or sweep, in the Ionic and Composite capitals, is usually a quadrant of a circle: whence it is also commonly called the *quarter round*. It is usually cut with representations of eggs and arrow-heads or anchors placed alternately.

OUSE, a river which rises in the north of Yorkshire, runs south-east by York, Cawood, and Selby, and falls into the Humber to the west of St Cay.

OUSSE, a river which rises near Fitwell in Oxfordshire, and proceeds to Buckingham, Stony-Stratford, and Newport-Pagnel, in Buckinghamshire; from thence it proceeds to Bedford, and, turning north-east, it passes on to Huntingdon and Ely, till at length it arrives at Lynn-Regis in Norfolk, and falls into the sea.

OUSTIOUG, a town of the Russian empire, and capital of a province of the same name, with an archbishop's see and a castle; seated on the river Suchana, over-against the mouth of the Jug, in E. Long. 43. 25. N. Lat. 61. 48.

OUSTIOUG, a province of the Russian empire, bounded on the north by Dwina, on the east by the forest of Zirani, on the south by Wologda, and on the west by Cargapol and Waga. It is divided into two parts by the river Suchana; is full of forests; and the rivers yield plenty of fish, which the inhabitants dry in the sun, and which make their principal nourishment.

OUT-POSTS, in a military sense, a body of men posted beyond the grand guard; called *out posts*, as being the rounds or limits of the camp.

OUTLAW, signifies one that is deprived of the benefit of the law, and therefore held to be out of the king's protection. See the next article.

OUTLAWRY, is where a person is outlawed, and so that account loses the benefit of a subject.—The process of outlawry lies in indictments of treason or felony, and also of trespass *vi et armis*, conspiracy, &c. And by statute, persons may be outlawed in many civil actions; as debt, case, covenant, &c.

OVUM ANGUINUM. See ANGUINUM.

OUTWORKS, in fortification, all those works made without-side the ditch of a fortified place, to cover and defend it. See FORTIFICATION.

OUZEL, in ornithology; a species of MOTACILLA.

OWEN (Thomas), a judge of the common-pleas, was the son of Richard Owen, Esq; of Condovery in Shropshire, and educated at Oxford; whether in Christ-church college, or Broadgate hall, is not determined. Having taken a degree in arts, he left the university, and entered himself of Lincoln's inn in London, where in process of time he became an eminent counsellor. In 1583 he was elected Lent-reader to that society. In 1590 he was made serjeant at law, and queen's serjeant soon after. He arrived at length at the dignity of judge of the common-pleas; which office he is said to have executed, during five years, with great abilities and integrity. He died in 1598; and was buried on the south side of the choir in Westminster abbey, where a monument was erected to his memory. He had the reputation of a learned man, and a patron of literature.

Vol. VIII.

He was the author of "Reports in the common pleas, wherein are many choice cases, most of them thoroughly argued by the learned serjeants, and after argued and resolved by the grave judges of those times, with many cases wherein the difference of the year-books are reconciled and explained." Lond. 1656, fol.

OWEN (Dr John), an eminent and learned dissenting minister, was born in 1616, at Hadham, in Oxfordshire, of which place his father was vicar. He made such surprising proficiency in learning, that at twelve years of age he was admitted into Queen's College, Oxford, and in 1635 was made master of arts; but soon after, disapproving the new regulations made by archbishop Laud their chancellor, with which he refused to comply, he was obliged, in 1637, to leave the college; when taking orders, he became chaplain to Sir Robert Dormer of Afcot in Oxfordshire, and was at the same time tutor to his eldest son. He was afterwards chaplain to John Lord Lovelace of Hurley, in Berkshire; when the civil war breaking out, he openly avowed the cause of the parliament; which was so resented by an uncle, who had intended to leave him his estate, that he discarded him, and left it to another. Yet though Lord Lovelace sided with the king, he treated his chaplain with great civility: but on his going to join the royal army, Mr Owen went to London, and soon after joined the non-conformists. In 1642 he published his book, intitled, *A display of Arminianism*, which laid the foundation of his future advancement: for the committee for purging the church of scandalous ministers were so pleased with it, that Mr White their chairman sent him a presentation of the living of Fordham in Essex: but when he had been there about a year and a half, the patron hearing that the sequestered incumbent was dead, presented another to the living; upon which the Earl of Warwick gave Mr Owen the living of Coggeshall. He had not, however, been long at that town before he left the Presbyterians; and, joining the independents, formed a church there. He was now sent for several times to preach before the parliament; and among the rest on the 28th of February 1648-9, the day of humiliation for the intended expedition to Ireland. Cromwell, who was present at this last discourse, and had never heard him before, was extremely pleased with it, and desired his company into Ireland, and that he would reside in the college of Dublin. This he did; but returned in about half a year. Soon after Cromwell sent him into Scotland; but he also returned from thence after about half a year's stay at Edinburgh. He was then promoted to the deanery of Christ-church, Oxford; whither he went in 1651; and Cromwell, being now chancellor of the university, nominated him his vice-chancellor. The next year he was created doctor of divinity by diploma. Dr Owen enjoyed the post of vice-chancellor five years; during which he behaved with the greatest moderation: for, though often solicited, he never molested the meeting of the royalists at the house of Dr Willis the physician, where divine service was performed according to the liturgy of the church of England; and though he was a commissioner for ejecting scandalous ministers, he frequently overruled his brethren in favour of those royalists who were distinguished by their merit. At the death of Cromwell, he was removed from the vice-chancellorship;

and at the Restoration was ejected from his deanery of Christ-church. But he had provided himself a comfortable retreat at an estate he had purchased at Hadham. He now employed himself in preaching as often as he had an opportunity, and in writing books; one of which, intitled *Fiat Lux*, falling in the hands of Lord Clarendon, he was so pleased with it, or (as is said) from policy pretended to be so, that he sent for Dr. Owen, and, acknowledging the service he had done by it to the Protestant religion, offered to prefer him in the church, if he would conform; but he desired to be excused.—His moderation drew him respect from persons of opposite principles; and in the number of his friends were Dr. Wilkins: bishop of Chetter, and Dr. Barlow bishop of London. He died at Ealing in 1683. His works are printed in seven volumes. folio.

OWL, in ornithology. See STRIX.

OWLING, so called from its being usually carried on in the night, is the offence of transporting wool or sheep out of this kingdom, to the detriment of its staple manufacture. This was forbidden at common law, and more particularly by statute 11 Edw. III. c. 1, when the importance of our woollen manufacture was first attended to; and there are now many later statutes relating to this offence, the most useful and principal of which are those enacted in the reign of Queen Elizabeth, and since. The statute 8 Eliz. c. 3. makes the transportation of live sheep, or embarking them on board any ship, for the first offence forfeiture of goods, and imprisonment for a year, and that at the end of the year the left hand shall be cut off in some public market, and shall be there nailed up in the openest place; and the second offence is felony. The statutes 12 Car. II. c. 32. and 7 & 8 Will. III. c. 28. make the exportation of wool, sheep, or fuller's earth, liable to pecuniary penalties, and the forfeiture of the interest of the ship and cargo by the owners, if privy; and confiscation of goods, and three years imprisonment to the master and all the mariners. And the statute 4 Geo. I. c. 11. (amended and farther enforced by 12 Geo. II. c. 21. and 19 Geo. II. c. 34.) makes it transportation for seven years, if the penalties be not paid.

OXALIS, WOODSORREL; a genus of the pentagynia order, belonging to the decandria class of plants. There are seven species; of which the only remarkable is the acetosella, or common wood-forrel. This grows naturally in moist shady woods, and at the sides of hedges in many parts of Britain, so is but seldom admitted into gardens. The roots are composed of many scaly joints, which propagate in great plenty. The leaves arise immediately from the roots upon single long foot-stalks, and are composed of three heart-shaped lobes. They are gratefully acid, and of use in the scurvy and other putrid disorders.

OXFORD, the capital of a county of the same name in England, celebrated for its university, and pleasantly situated in a plain, with a fine fruitful country all around. The composition of the name is obvious. In the British times it seems to have been a place of study; but in the Saxon era, it was noted only for a religious house dedicated to St Frideswide, till Alfred built three colleges, one for grammarians, another for philosophers, and a third for divines. Learning continued

to flourish till the city was sacked and burnt by the Danes in the reign of Ethelred; and after that, Harold, furnished *Harefoot*, treated it with great severity upon some provocation he had received. It seems to have been besieged and taken by William the Conqueror, and to have been deserted by the learned from that time till about the year 1129, when one Robert Pulein began to read lectures in divinity; and such was the resort of students to it, that in the reign of King John there were not fewer than three thousand. Robert d'Oily, a Norman, to whom William the Conqueror had given the greatest part of it, built a castle on the west side in 1071; and he is also supposed to have surrounded it with walls. In a palace built by Henry I. was born Richard I. commonly called *Cœur de Lion*. About the tenth of King John, there happened a quarrel between the citizens and students; in consequence of which many of the latter quitted it, but returned again a few years afterwards. Here Henry III. held a parliament to settle the differences betwixt him and his barons; when he confirmed the privileges granted to the university by his predecessors, and added others of his own. In this reign the students are said to have been 30,000; who were all excommunicated by the pope for some rudeness to his legate. In Edward III's time, they were split into two factions, called the *northern* and *southern men*; a division which was attended with many disorders and much violence, but in a short time concord and harmony again prevailed. As colleges began about this time to be founded and endowed, we shall here present our readers with a list of them, together with the time when, and the persons by whom, they were founded.

Colleges.	Founders.	Kings reigned.
University.	King Alfred.	Alfred.
Baliol.	{ Sir John Baliol, father to the king of Scots.	{ Henry III.
Merton.	{ Walter Merton, lord chancellor and bishop of Rochester.	{ Edward I.
Oriel.	Edward the Second.	Edw. II.
Exeter.	Walter Stapleton, bishop.	Edw. II.
Queen's.	Robert Eglishield, B. D.	Edw. III.
New College.	{ William of Wickham, bishop of Winchester, lord chancellor.	{ Edw. III.
Lincoln.	{ Richard Fleming, bishop of Lincoln.	{ Henry VI.
All Souls.	{ Hugh Chicheley, archbishop of Canterbury.	{ Henry VI.
Magdalen.	{ William Wainfleet, bishop of Winchester, lord chancellor.	{ Henry VI.
Bresen-Nofe.	{ William Smith, bishop of Lincoln, and Richard Sutton, Esq.	{ Hen. VIII.
Corpus-Christi.	{ Richard Fox, bishop of Winchester, and lord privy-seal.	{ Hen. VIII.
Christ Church.	Henry VIII.	Hen. VIII.
Trinity.	Sir Thomas Pope.	Mary.
St John Baptist.	{ Sir Thomas White, merchant of London.	{ Mary.
Jesus.	Queen Elizabeth.	Elizabeth.
Wadham.	Nicholas and Dorothy Wadham.	James I.
Pembroke.	{ Thomas Tisdale, Esq; and Dr Richard Whitwick.	{ James I.
Worcester	was called <i>Gloucester-hall</i> till lately, that it was endowed by Sir Thomas Coke, and made collegiate.	
Hartford	was <i>Hart-hall</i> till 1740, that it was erected into a college.	

All these are richly endowed, and have fine gardens, libraries, chapels, &c. The halls in which the students maintain themselves, except a few that have exhibitions, are these: St Edmund's, belonging to Queen's college; Magdalen, to Magdalen college; St Alban's

Oxford. ban's, to Merton; St Mary's, to Oriel; New-Inn, to New-College. Several persons have been great benefactors to particular colleges, as Dr Ratcliffe to University-college; colonel Codrington and Dr Clarke, to All-souls; queen Caroline, to Queen's; the before-mentioned Dr Clarke and Mrs Eaton, to Worcester; Dr Wake, archbishop of Canterbury, to Christ-church. The most considerable of these colleges are Magdalen's and Christ-Church, which are as noble foundations as any in the world. The church of the latter is the cathedral, and has a dean, eight canons, eight chaplains, eight singing men, eight choristers, a teacher of music, and an organist. Each of the colleges has its visitor appointed by its statutes, except Christ-Church, which is subject to the visitation of the Sovereign alone. The other remarkable buildings belonging to the university are, first, the public schools; secondly, the Bodleian or public library; thirdly, Ratcliffe's library, a most elegant structure, for building and furnishing which, Dr Ratcliffe left 40,000*l.*; fourthly, the theatre, built by Sheldon, archbishop of Canterbury; fifthly, the museum, in which is an laboratory and a repository for natural and artificial rarities and antiquities; sixthly, the Clarendon printing-house, so called, because it was built partly with the money arising to the university by the sale of Lord Clarendon's library. To the south of Magdalen college lies the physic garden, instituted by the Earl of Danby, and much improved by Dr Sherrard. It contains five acres, in which is a complete series of such plants as grow naturally, disposed in their respective classes; together with two neat and convenient green-houses; stocked with a valuable collection of exotics, and a hot-house, where various plants brought from the warmer climates are raised. The whole body of the university, including professors, fellows, and students of all sorts, exceeds 3000. Each college has its particular statutes and rules for its government. There are four terms in the year for public exercises, &c. and particular days and hours for public lectures by the several professors. The university is governed by a chancellor, high-steward, vice-chancellor, two proctors, a public orator, a keeper of the archives, a regenter, three squire-beadles, and three yeomen-beadles. As to the city, it has had the same privileges granted to it as London, particularly an exemption from toll all over England. It is governed by a mayor, high-steward, recorder, four aldermen, eight assistants, two bailiffs, a town-clerk, two chamberlains, all that have borne the office of bailiff and chamberlain, and twenty-four common-council men: but these are subject to the chancellor or vice-chancellor of the university in all affairs of moment; and not only the mayor, but the principal citizens, and sheriff of the county, take an oath to maintain the privileges of the university. The city, including the colleges, is one of the largest in England, having thirteen parish-churches, besides the cathedral, well built, clean, and regular. At the entrance of the town from the Woodstock and Banbury roads, a neat hospital bath been lately erected by the trustees of Dr Ratcliffe's bequest, out of the surplus money remaining after defraying the expence of his library. The male line of the family of Vere, to whom the city had given the title of earl for 500 years, failing in Aubrey de Vere, who was twentieth earl, queen Anne conferred the title

upon Robert Harley, a descendant of the Veres, in whose family it still continues. The chief trade of the city is in malt, conveyed in barges to London.

OXFORDSHIRE, a county of England, bounded on the west by Gloucestershire; on the south, where it is broadest, the river Isis divides it from Berkshire; on the east, it is bounded by Buckinghamshire; and on the north, where it terminates in a narrow point, it has on the one side Northamptonshire, and on the other Warwickshire. It extends from Cleydon to Caverham 42 miles in length, and from Cleydon to Farrington 26 in breadth, making about 120 in circumference; within which are contained one city, 15 market-towns, 283 parishes, 14 hundreds, 534,000 acres, and about 120,000 souls. The air is sweet and pleasant, and the soil rich and fertile. The lower parts consist of meadows and corn-fields, and the higher were covered with woods till the civil wars; in which they were so entirely destroyed, that wood is now extremely scarce and dear, except in what is called the chiltern, and so is coal; of consequence fuel bears an exorbitant price. The county is extremely well watered; for besides the Isis, Tame, Cherwell, Evenlode, and Windrush, there is a great number of lesser rivers and brooks. One of the four great Roman ways passes quite through it, entering at the parish of Chinner, and going out at that of Goring. There is another lesser one, that extends between Colnbrook and Wallingford, called *Gremesdike*. The county sends nine members to parliament, viz. two for the shire, two for the city, two for the university, two for new Woodstock, and one for Banbury.

OXGANG, or **OXGATE**, is generally taken, in our old law-books, for 15 acres, or as much ground as a single ox can plough in a year.

OXUCLÆ, in natural history, the name of a genus of fossils of the class of selenite, but of the columnar, not the rhomboidal kind. Of this genus there are only two known species: 1. A fine kind with thin flakes and transverse filaments, found in the clayey banks of the river Nen, near Peterborough in Northamptonshire; and, 2. A dull kind with thick plates and longitudinal filaments. This is not uncommon in Yorkshire, and lies sometimes in a yellow, and sometimes in a blue clay.

OXUS, or **JIRUN**, a large river of Asia, which rises in the mountains north of India; and running north-west, through Ufsek Tartary, separates that country from Persia, and falls into the Caspian sea in 44° N. Lat.

OXYCRATE, in pharmacy, a mixture of vinegar and water, proper to alluage, cool, and refresh. The usual proportion is one spoonful of vinegar to five or six spoonfuls of water.

OXYGLYCU, a species of drink prepared of the sweetest honey-combs macerated and boiled. The combs, from which all the honey has been expressed, are put into a pot with pure water, and boiled till they seem to have deposited all their contained honey in the water. This liquor is to be kept; and, when diluted with cold water, is to be drank in the summer-time, in order to remove thirst.

OXYMELE, in pharmacy, a composition of vinegar and honey. See **PHARMACY**.

OYER, in law-books, seems to have been anciently used for what is now called *affixer*. See **ASSISE**.

O yes
Oyster.

OYES, a corruption of the French OYER, *Hear ye*; a term or formula frequently used by the criers in our courts on making proclamations, or to enjoin silence.

OYSTER, in zoology, see OSTREA.

The oyster affords the curious in microscopic observations a very pleasing entertainment. In the clear liquor many little round living animalcules have been found, whose bodies being conjoined, form spherical figures, with tails not changing their place otherwise than by sinking to the bottom, as being heavier than the fluid; these have been seen frequently separating, and then coming together again. In other oysters, animalcules of the same kind were found, not conjoined, but swimming by one another, whence they seemed in a more perfect state, and were judged by Mr Lieuwenhoek to be the animalcules in the roe or semen of the oyster.

A female oyster being opened, incredible multitudes of small embryo oysters were seen, covered with little shells, perfectly transparent, and swimming along slowly in the liquor; and in another female, the young ones were found of a browner colour, and without any appearance of life or motion.

Monsieur Joblot also kept the water running from oysters three days, and it appeared full of young oysters swimming about nimbly in it; these increased in size daily; but a mixture of wine, or the vapour of vinegar, killed them.

In the month of August oysters are supposed to breed, because young ones are then found in them. Mr Lieuwenhoek, on the 4th of August, opened an oyster, and took out of it a prodigious number of minute oysters, all alive, and swimming nimbly about in the liquor, by means of certain exceeding small organs, extending a little way beyond their shells; and these he calls their beards. In these little oysters, he could discover the joinings of the shells; and perceived that there were some dead ones, with their shells gaping. These, tho' so extremely minute, are seen to be as like the large oysters in form as one egg is to another.

As to the size of them, he computes, that 120 of them in a row would extend an inch; and consequently, that a globular body, whose diameter is an inch, would, if they were also round, be equal to 1,728,000 of them. He reckons 3000 or 4000 are in one oyster, and found many of the embryo oysters among the bairds; some fastened thereto by slender filaments, and others lying loose: he likewise found animalcules in the liquor 500 times less than the embryo oysters.

It is not very uncommon to see on oyster-shells, when in a dark place, a shining matter or bluish light, like a flame of brimstone, which sticks to the fingers when touched, and continues shining and giving light for a considerable time, though without any sensible heat. This shining matter being examined with a microscope, was found to consist of three sorts of animalcules; the first whitish, and having 24 or 25 legs on a side, forked, a black speck on one part of the head, the back like an eel with the skin stripped off. The

second sort, red, resembling the common glow-worm, with folds on its back, but legs like the former; a nose like a dog's, and one eye in the head. The third sort, speckled, with a head like a foal, with many tufts of whitish hairs on the sides of it. Some much larger and greyish might be seen, having great heads, two horns like a snail's, and six or eight whitish feet; but these did not seem to shine.

OYSTER-CATCHER. See HEMATOPUS.

OYSTER-SHELLS. See CHEMISTRY, n° 345.

OZÆNA, a foul and malignant ulcer of the nose, distinguished by its fetor, and often accompanied with a caries of the bones of the nose.

OZELL (John), a well known translator, was educated in Christ's Hospital, was possessed of a competent fortune, and always enjoyed good places; being auditor-general of the city and bridge accounts, of St Paul's cathedral, and of St Thomas's hospital. Notwithstanding his attention to business, he still retained a love for polite literature: and though he did not appear as an original author, yet having made himself master of most of the living languages, he favoured the world with many translations from these, as well as from the Latin and Greek; which, if they are not the most elegant, are generally faithful and true to the originals. He died in the year 1743.

OZANAM (James), an eminent French mathematician, born at Boligneux in Bresse, in 1640, of a wealthy family. His father gave him a good education, and designed him for the church: but some mathematical books falling into his hands, inspired him with a love for that science; and though he had no master to instruct him, he made such progress in it, that, at 15 years of age, he wrote a piece in mathematics, which he thought proper to insert in the works he afterwards published. He at length taught that science at Lyons; and his mathematical lessons brought him in a considerable revenue, till the year 1701: at which period, a war breaking out on the succession to the crown of Spain, he lost almost all his scholars, and was reduced to a very melancholy situation; and his wife dying the same year, he was so afflicted, that he never perfectly recovered it. In 1702, he was admitted into the Royal Academy of Sciences; and died of an apoplexy, in 1717.—He was of a mild and serene temper, of singular generosity, and of a cheerful disposition.—He would not allow himself to know more of religion than the common people. He used to say, that "it was the business of the doctors of Sorbonne to dispute, of the Pope to decide, and of a mathematician to go to heaven in a perpendicular line." His works are very numerous, and have met with the approbation of the learned. The principal are, 1. Practical geometry, 12mo. 2. A mathematical dictionary. 3. A course of mathematics, 5 vols, 8vo. 4. Mathematical and philosophical recreations, the most complete edition of which is that of 1724, in 4 vols 8vo. 5. An easy method of surveying. 6. New elements of algebra, a work much commended by Mons. Leibnitz. 7. Theoretical and practical perspective, &c.

Oyster
Ozanam.

P.

P, or **p**, the 15th letter and 11th consonant of the alphabet; the sound of which is formed by expressing the breath somewhat more suddenly than in forming the sound of *b*; in other respects these two sounds are pretty much alike, and are often confounded one with another. When *p* stands before *t* or *f*, its sound is lost; as in the words *psalmus*, *psychology*, *ptolemaic*, *ptisan*, &c. When placed before *h*, they both together have the sound of *f*; as in *philosophy*, *physic*, &c.

As an abbreviation, *P* stands for *Publius*, *Pondo*, &c. *P.A.DIG.* for *Patricia Dignitas*; *P. C.* for *Patres Conscripti*; *P. F.* for *Publii Filius*; *P. P.* for *Propositum*, or *Propositum publicæ*; *P. R.* for *Populus Romanus*; *P. R. S.* for *Prætoris sententia*, *P. R. S. P.* for *Præfes provincia*.

In the Italian music, *P* stands for *piano*, or "softly," and *P. P. P.* for *pianissimo*, or "very softly."

Among astronomers, *P. M.* is used to denote *post meridiem*, or afternoon.

Among physicians, *P* stands for *pugil*, or the eighth part of an handful, *P. Æ. partes æuales*, or equal parts of the ingredients; *P. P.* signifies *pulvis patrum*, or Jesuit's bark in powder; and *ppt. præparatus*, or prepared.

As a numeral, *P* signifies the same with *G*, viz. 400; and with a dash over it thus, *Ġ*, 400,000.

PABULUM, among natural philosophers, the same with **FUEL**.

PACE, a measure taken from the space between the two feet of a man in walking; usually reckoned two feet and a half, and in some men a yard or three feet. The geometrical pace is five feet; and 60,000 such paces make one degree on the equator.

PACE, in the manege, is of three kinds, viz. walk, trot, and gallop; to which may be added an amble, because some horses have it naturally.

Horses which go shuffling, or with mixed paces between the walk and amble, are for the most part of no value; which commonly proceeds from their fiery temper, but sometimes from a weakness in their reins or legs.

PACE (Richard), a learned Englishman, born about the year 1482. He was educated at the charge of Thomas Langton bishop of Winchester, whom he served as an amanuensis, and afterwards entered into the service of cardinal Bainbridge. His accomplishments rendered him so acceptable to Henry VIII. that he made him secretary of state; and, entering into orders, he was admitted prebendary in the church of York, archdeacon of Dorset, and dean of St Paul's, &c. which preferments were conferred on him during his absence on foreign embassies. In 1524, he was sent to Rome on the death of pope Leo X. to solicit the papal chair for cardinal Wolsey; but a new Pope was elected before his arrival, a circumstance that proved the epocha of his troubles. He fell under the displeasure of the disappointed cardinal; and being soon after employed as ambassador at Venice, he was so neglected and hardly used, that he was seized with a

phrenzy: upon which the king ordered him home; and being carefully attended by the physicians at the king's command, he was in a short time restored to the use of his reason, and then applied himself to the study of the Hebrew tongue. Being now introduced to his Majesty, he remonstrated against the Cardinal's cruelty: who being ordered to clear himself, summoned Pace before him, sitting in judgment with the duke of Norfolk and others; who condemned Pace, and sent him to the Tower; where he remained two years, till he was discharged by the king's command.—When he was enlarged, he resigned his deaneries, and died in retirement at Stepney in 1532; after having wrote several works, and enjoyed the esteem of the learned among his contemporaries; especially of Sir Thomas More, and Erasmus.

PACHAMAC, a valley of Peru, in South America, ten miles south of Lima; celebrated for its pleasantness and fertility, but more on account of a magnificent temple built by the Incas of Peru, to the honour of their god. When the Spaniards conquered Peru, they found immense riches therein.

PACHODECARTHOMBIS, in natural history, the name of a genus of fossils, of the class of *silemitæ*, expressing a thick rhomboidal body composed of ten planes.

PACHSU, a small island in the Mediterranean sea, near the coast of Epirus, and in European Turkey. It lies south of Corfu, and is subject to Venice.

PACIFIC OCEAN, that vast ocean which separates Asia from America. It is called *Pacific*, from the moderate weather the first mariners who sailed in it met with between the tropics; and it was called *South Sea*, because the Spaniards crossed the isthmus of Darien from north to south, when they first discovered it; tho' it is properly the Western ocean, with regard to America.

PACK, in commerce, denotes a quantity of goods, made up in loads, or bales, for carriage.

A pack of wool is 17 stone and 2 pounds, or a horse's load.

PACKET, or **PACKET-Boat**, a vessel appointed by the government to carry the mail of letters, packets, and expresses, from one kingdom to another by sea, in the most expeditious manner. Thus, the packet-boats, under the direction of the post-master-general of Great Britain, carry the mails from Dover to Calais, from Falmouth to Lisbon, from Harwich to Helvoetsluys, and from Parkgate to Dublin.

PACTOLUS (anc. geog.), a river of Lydia, called *Chrysorrhœa*, from its rolling down golden sand, according to Herodotus, Plutarch, Pliny, and Strabo; rising in mount Tmolus, (Strabo). From this river Cæsus is thought to have had all his riches. In Strabo's time it ceased to roll down any. It ran thro' Sardes; after which it fell into the Hermus, and both together into the Ægean Sea at Phocæa in Ionia. A river celebrated by Virgil, Ovid, Lucan, Lycophron, Horace, Apollonius.

PACKAGE, is a small duty of one penny in the pound,

Pachamac
Packages

P
Pace

Pacos
Paderborn.

pound, paid for all goods not particularly rated.

PACOS, in zoology. See CAMELUS.

PACUVIUS (Marcus), of Brundisium in Calabria, a tragic poet in high reputation about the year of Rome 600. He was nephew of Ennius; published several theatrical pieces, tho' we have only some fragments of his poetry remaining; and died at Tarentum at above 90 years of age.

PADAN ARAM (Bible), literally the plains of Aram, or Syria; translated by the Seventy, simply Mesopotamia, or Mopsopotamia, of Syria; by the Vulgate, Syria; the Syrians on this and on the other side of the Euphrates, not differing remarkably from each other in language and manners, as Josephus allows.

PADDOC, or PADDOC-Course, a piece of ground encompassed with pales or a wall, and taken out of a park for exhibiting races with grey-hounds, for plates, wagers, or the like.

A paddoc is generally a mile long, and a quarter of a mile broad: at the one end is a little house where the dogs are to be entered, and whence they are slipped; near which are pens to inclose two or three deer for the sport. Along the course are several posts, viz. the low post, which is 160 yards from the dog-house and pens; the quarter of a mile post, half-mile post, and pinching post; besides the ditch, which is a place made to receive the deer, and preserve them from farther pursuit. And near this place are seats for the judges chosen to decide the wager.

The keepers, in order to slip the dogs fairly, put a falling collar upon each, slipped round a ring; and the deer being turned loose, and put forward by a teaser, as soon as he is arrived at the low-post, the dog-house door is thrown open, and the dogs slipped. If now the deer swerve so much, as that his head is judged nearer the dog-house than the ditch before he arrive at the pinching-post, it is no match, and must be run over again three days after: but if the deer runs straight beyond the pinching-post, then that dog which is nearest when he swerves, or is blanced by any accident, wins the match; but if no such swerve happens, then the match is won by the dog who first leaps the ditch.

PADERBORN, a duchy of Germany in the circle of Westphalia, has the county of Lippe on the north and west; Hesse-Cassel and Waldeck, on the south; and Munster, with the duchy of Westphalia, on the west. Its greatest length from east to west is about 40 miles, and its breadth where widest 30. Some parts of it yield good pasture, and breed abundance of cattle; but it is not very fruitful in corn. There is a heath called the *Senne* or *Sende*, of great extent, but very barren and desolate. There are, however, good iron mines in the country, with salt and medicinal springs, plenty of deer and other game; and it is watered with several rivers abounding with fish, as the Weser, the Dimer, the Bever, the Nette, the great Emmer, the Lippe, the Alme, and the Pader. It contains 54 parishes, in which are 25 market-towns, and 16 monasteries. The Roman Catholic is the predominant religion of the country, yet there are also many Protestants in it. The bishopric was erected by Charlemagne, towards the close of the eighth century; and the cathedral was consecrated by pope Leo in

person, anno 796. The bishop is sovereign of the Paderborn country, a prince of the empire, and suffragan of the archbishop of Mentz. His revenue is about 30,000 pounds a year, and he is able to raise 3000 men. In the matricula, his assessment is 18 horse and 34 foot, or 352 florins monthly in lieu of them. Towards the charges of the sovereign courts of the empire, he pays for each term, 162 rix-dollars and 29 kruitzers. The chapter consists of 24 caputular canons, who must prove their noble extraction by four descents. The arms of the bishopric are a cross or, in a field gules. For the government of it, and the administration of justice, there are several councils and colleges under the bishop. Here are also a hereditary marshal, sewer, cup-bearer, chamberlain, steward, and purveyor. It was in this bishopric that Quintilius Varus, with the Roman army under his command, was routed by the Germans under Arminius.

PADDERBORN, the capital of the above bishopric. It stands 40 miles north-west of Cassel, 50 south-east of Munster, and 60 south-west of Hanover; being a large, populous, well built, and well fortified city. Its name is compounded of *pader*, a rivulet, which rises just under the high altar of the cathedral, and *born*, i. e. a spring. It was one of the Hanse-towns; and, till 1604, an imperial city. The cathedral is a grand fabric, inferior to few in the empire. There is a gold crucifix in it of 60 pounds weight, presented by Otho II. The university, of which the Jesuits have the direction, was founded in 1592, and the walls were built in the beginning of the 11th century. In 1530, an attempt was made to introduce Lutheranism; but 16 of the principal citizens who had embraced it were executed, and the rest obliged to abjure it. Duke Christian of Brunswick carried off from hence, in 1692, the silver images of the 12 apostles, and the silver coffin of St Lotharius; and had them coined into money, with this inscription, *God's Friend, the Priests Enemy*. The trade of this town, though formerly great, is now inconsiderable; and the inhabitants subsist mostly by agriculture, and breeding of cattle. Though the bishop has a palace in the city, he resides (when he vouchsafes to visit this country, which is seldom, having other and more valuable benefices) at Neuhaus, seven miles off, where he has a magnificent castle. Charlemagne, and other emperors, sometimes resided here, and held diets of the empire.

PADUA, an ancient, large, and celebrated city of Italy, with an university and a bishop's see. It is also capital of the Paduano; but is much less considerable than it was formerly: for it now contains no more than 30,000 inhabitants, whereas it formerly had 100,000, and many of the houses are gone to ruin: however, the hall where justice is administered, is a superb structure. The cathedral church, and the college of the university, are in that part called the *Old Town*; and there are piazzas under all the houses, where persons may walk without being exposed to the weather. The garden of the university is curious, on account of the number of plants. Here a student may take his degrees, let him be of what sect of Christianity he will; nay, though he should be a Jew or a Turk. The patron of this city is St Anthony, who lies in the cathedral; they have such a veneration for him, that the

beggars

PADUANO || **Pazona.** beggars do not ask charity in the name of God, but for the love of St Anthony. The Jews live in a distinct part of the city; and the neighbouring mountains produce excellent wine and oil, with delicious fruit. It was taken by the Venetians in 1706. It is seated on the rivers Brenta and Bachiaglione, in a fine plain; and is about seven miles in circumference. E. Long. 11. 55. N. Lat. 45. 24.

PADUANO, a small province of Italy, in the territory of Venice, bounded on the east by the Dogado, on the south by the Polesino di Rovigo, on the west by the Veronese, and on the north by the Vicentino. Its soil is well watered; and is one of the most fertile in Italy. The province is about 40 miles in length, and 35 in breadth. Padua is the capital town.

PADUAN, among the medalists, a modern medal struck in imitation of the antique, or a new medal struck with all the marks and characters of antiquity. This name is properly applicable to those medals only that were struck, in the seventh century, by an Italian painter, born at Padua; who succeeded so well in the imposture, that the best judges are at a loss to distinguish his medals from the genuine ones. Tho' it is frequently used in general for all medals of this kind.

PADUS, anciently called *Eridanus*, especially by the Greeks; a river famous for the fable of Phaeton, (Ovid). It rises in mount Vesulus, in the Alpes Cothiz, from three springs, dividing the Cisalpine Gaul into the Transpadana and Cispadana, (Strabo); and, swelled by other rivers falling into it on each side from the Alps and Appennines, it discharges itself with a course from west to east, at seven mouths, into the Adriatic, (Mela). The lake thro' which it discharges itself into the sea, is called by the natives the *Seven Seas*. Now the *Po*.

PADUS, in botany. See **PRUNUS**.

PÆAN, among the ancient pagans, was a song of rejoicing sung in honour of Apollo, chiefly used on occasions of victory and triumph. See **APOLLO**.

PÆAN, in the ancient poetry, a foot consisting of four syllables; of which there are four kinds, the pæan primus, secundus, &c.

The pæan primus consists of one long syllable and three short ones, or a trochæus and pyrrhichius, as *temporibus*; the pæan secundus consists of a short syllable, a long, and two short, or an iambus and a pyrrhichius, as *potentia*; the pæan tertius consists of two short syllables, a long and a short one, or a pyrrhichius and a trochæus, as *animatus*; the pæan quartus consists of three short syllables and a long one, or a pyrrhichius and iambus, as *celeritas*.

PÆDO-BAPTISM; infant-baptism, or that conferred on children.

PÆONIA, **PIONY**; a genus of the digynia order, belonging to the polyandria class of plants. There are two species, both of them very hardy, and will flourish in any common soil. They are large herbaceous flowery perennials, with tuberous roots, sending up strong annual stalks from one to three feet in height; terminated by very large flowers of a beautiful red colour, and much larger than any rose. The common official, or male piony, also is remarkable for its capsules turning backward, opening and displaying their red inside, together with the numerous seeds, in a singular-

ly agreeable order, appearing very ornamental after the flower is past. The plants may be propagated either by parting the roots, or by seed. This plant was formerly celebrated in nervous distempers, but the present practice pays very little regard to it.

PÆSTUM, called *Pesidonia* by the Greeks, a town of Lucania, on the Sinus Pælinus: an ancient colony prior to the first Punic war, according to Livy; but later, according to Velleius. *Pæstina rose* were in great esteem, and produced twice a-year. (Virgil, Ovid).

PAGAN, a heathen, gentile, or idolater; one who adores false gods. See **MYTHOLOGY**.

PAGANALLIA, certain festivals observed by the ancient Romans in the month of January. They were instituted by Servius Tullius, who appointed a certain number of villages (*pagi*), in each of which an altar was to be raised for annual sacrifices to their tutelar gods; at which all the inhabitants were to assist, and give presents in money, according to their sex and age, by which means the number of country-people was known. The servants upon this occasion offered cakes to Ceres and Tellus, to obtain plentiful harvests.

PAGANELLUS, in ichthyology. See **GOBIUS**.

PAGANISM, the religious worship and discipline of pagans; or, the adoration of idols and false gods. See **IDOLATRY** and **MYTHOLOGY**.

PAGEANT, a triumphal car, chariot, arch, or other like pompous decoration, variously adorned with colours, flags, &c. carried about in public shews, processions, &c.

PAGI (Antony), a very famous Cordelier, and one of the ablest critics of his time, was born at Rogne in Provence in 1624. He took the habit in the convent at Arles in 1641, and was at length four times provincial of his order; but his religious duties did not prevent his vigorous application to the study of chronology and ecclesiastical history, in which he excelled. His most considerable work is, "A Critique upon the Annals of Baronius;" where, following the learned cardinal year by year, he has rectified an infinite number of mistakes, both in chronology and in the representation of facts. He published the first volume in 1689, dedicated to the clergy of France, who allowed him a pension: the whole was printed after his death, in 4 vols. folio, at Geneva, in 1705, by the care of his nephew Francis Pagi, of the same order. He wrote some other things before his death, which happened in 1699; and had the character of an able historian as well as of a learned and candid critic. His nephew, Francis, above mentioned, wrote "A Chronological Abridgment of the history of the Popes," in Latin, 3 vols. 4to. Francis had also a nephew, Anthony Pagi, who added three more volumes to the History of the Popes; of which two more were intended, if not executed.

PAGNINUS (Senctes), a Dominican, illustrious for his skill in the Oriental languages, was born at Lucca in 1466. He applied himself to examine the vulgar translation of the Scriptures; and believing it to be either not of Jerom, or greatly corrupted, he undertook a new one from the present Hebrew text. It appears by a letter from Picus Mirandula to him, that he spent 25 years on this work, which is the first modern translation from the Hebrew; and the Jews who read

Pæstum || **Pæginus.**

Paged,
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read it, affirmed it to be more exact than the ancient translations: this, however, was his fault; for his scrupulous servile adherence to the letter of the original text, has, according to father Simon, made his translation obscure, barbarous, and full of solecisms. He afterward translated the New Testament from the Greek, as he had done the Old from the Hebrew, laying the Vulgar all the while before him; and dedicated it to pope Clement VII. He was also the author of a Hebrew Grammar and Lexicon, which Buxtorf made great use of in compiling his; and died in 1536.

PAGOD, or PAGODA, a name whereby the East Indians call the temples where they worship their gods.

PAGON, or Pagoda, is also the name of a gold and silver coin, current in several parts of the East Indies.

PAIN. See METAPHYSICS, n^o 23, 71.

As the brain is the seat of sensation, so it is of pain. Boerhaave, and most other authors on this subject, assign a stretching of the nerves as the only immediate cause of pain: but as the nerves do not appear to consist of fibres, this cause of pain does not seem to be well-founded; nor indeed will it be easy to treat this subject clearly, but in proportion as the means of sensation are understood.

Many kinds of pain are met with in authors: such as, A gravitative pain; in which there is a sense of weight on the part affected, which is always some fleshy one, as the liver, &c. A pulsative pain; which, Galen says, always succeeds some remarkable inflammation in the containing parts, and is observed in abscesses while suppurating. A tensive pain, which is also called a *distending* pain; it is excited by the distension of some nervous, muscular, or membranous part, either from some humour, or from flatulence. An acute pain is, when great pain is attended with quick and lively sensations: A dull pain is, when a kind of numbness is as much complained of as the pain is.

The mediate and more remote causes of pain are generally obvious; and when so, the cure will consist for the most part in removing them: for though in many instances the chief complaint is very distant from the seat of these causes, yet their removal is the proper method of relief. See MEDICINE, *passim*.

P A I N T I N G.

PAINTING is the art of representing to the eyes, by means of figures and colours, every object in nature that is discernible by the sight; and of sometimes expressing, by figures, the various emotions of the mind.

1. It is to be imagined that men must naturally and very early have conceived an idea of the first principles of the art of painting: the shadow of each plant and animal, and of each edifice, must have afforded them the means of conceiving the method of imitating the figures of all bodies whatever. But as in the first ages of the world the art of writing was unknown, as mankind were ignorant of astronomy, and as their year certainly did not consist of the same number of days as does that of the moderns, how is it possible to determine the epoch, the precise date, of the rise of each art or science? The Egyptians pretend that painting was in

Pain.

Perhaps all pains may be included, with irritation, in those that have spasm or inflammation for their source. When pain is owing to inflammation, the pulse is quicker than in a natural state; it is also generally full, hard, and tense; the pain is equal, throbbing, and unremitting. If a spasm is the cause, the pulse is rarely affected; at intervals the pain abates, and then returns with some degree of aggravation; gentle motion sometimes abates, or even cures, in some instances: but in inflammatory cases no such effects are ever experienced. See Dr Lobb's *Treatise on Painful Distempers*.

The pain so frequently attendant on child-bed women, called *after-pains* (from their happening only after being delivered of a child), are often occasioned by scooping to fetch away coagulated blood, which is a needless endeavour. When no improper treatment in delivering the secundines can be suspected, the irritability of the uterus alone is to be considered as the cause. Care should be taken not to confound these after-pains with, or mistake the pains attending puerperal fevers for, the colic. After-pains come by fits, and soon go off; but return at different intervals, which are longer each day, and after two or three days are usually at an end, though sometimes they continue seven or eight: notwithstanding these pains, the lochia flow properly, and generally more abundantly after the cessation of each fit; this does not happen in colicky complaints, nor is the belly so free from tumefaction when the puerperal fever is attendant.

As these pains are of the spasmodic kind, anodynes and gentle opiates, with frequent draughts of warm caudle, camomile tea, &c. are all that are required in order to their relief.

Among the various causes of pain, a singular one is related in the third vol. of the *Lond. Med. Obs. and Inq.* p. 241, &c. Some persons who had taken cold during their being salivated, were afflicted with pains which resisted all the usual methods of relief: at length the author of the narrative referred to, suggested the cause; and by exciting a fresh salivation, the pains abated; the spitting was kept up a little while, and permitted to abate with some caution; and thus the cures were completed.

use among them many ages before it was known among the Greeks: And the matter is highly probable; for the Egyptians being the most ancient people, the Greeks drew from them many other branches of learning; the hieroglyphics of the former were, moreover, a sort of painting. Diodorus Siculus, l. ii. c. 4. relates, that Semiramis, having re-established Babylon, built there a wall of two leagues and a half in circumference, the bricks of which were painted before they were burnt, and represented various kinds of animals. He adds, that she had another wall, on which were the figures of all sorts of animals painted in their natural colours: and that there were among them even pictures which represented hunting-matches and combats. This is, in fact, an anecdote of great antiquity.

2. The Greeks were acquainted with the art of writing: they were highly ostentatious, and had among them

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men of real genius. This was sufficient to make them attribute the invention of all the arts and sciences to themselves. Their authors, however, do not agree about the inventor of painting. Pliny, in his *Natural History*, *L. xxxv. c. 12.* assures us, that Dibutades, a potter of Sicyonia, invented the art of making figures in clay; but that he owed the invention to his daughter, who, on taking leave of her lover that was going to a distant country, contrived to trace on a wall, by the means of a lamp, the outline of his shadow: the father, by applying his clay to those lines, formed a statue, which he hardened in his stove; and which was preserved in the temple of the Nymphs, till the time that Mummius signalized himself by the destruction of Corinth. Love, therefore, was the first master of painting; and that god seems, at this day, to have renewed in France that method of the Greeks, by those portraits drawn from shadows, which they call a *la Silhouette*. It should seem, however, that neither the Greek historians, nor Pliny, were acquainted with that book of Moses intitled *Genesis*; for they would have there seen, in the xxxi chapter, that Rachel, the wife of Jacob, stole from her father Laban his images, or little figures of household gods; which was in the time of the highest antiquity: that Aaron afterwards made in the desert a golden calf; that the ark of the covenant of the Hebrews was ornamented with figures of cherubims; that Moses forbid the people the use of images: all of which supposes a knowledge of design.

Be this as it may, the Greeks seem to have carried the art to great perfection; if we may believe the stories related of their Apelles and Zeuxis.

3. The Romans were not without considerable masters in this art, in the latter times of the republic, and under the first emperors; but the inundation of barbarians, who ruined Italy, proved fatal to painting, and

almost reduced it to its first elements. It was in Italy, however, that the art returned to its ancient honour, and in the beginning of the 15th century; when Cimabue, betaking himself to the pencil, translated the poor remains of the art, from a Greek painter or two, into his own country. He was seconded by some Florentines. The first who got any reputation was Ghirlandai, Michael Angelo's master; Pietro Perugino, Raphael Urbin's master; and Andrea Verocchio, Leonardo Da Vinci's master. But the scholars far surpassed the masters; they not only effaced all that had been done before them, but carried painting to the highest perfection of which it is capable. It was not by their own noble works alone that they advanced painting; but by the number of pupils they bred up, and the schools they formed. Angelo, in particular, founded the school of Florence; Raphael, the school of Rome; and Leonardo, the school of Milan; to which must be added the Lombard school, established about the same time, and which became very considerable under Giorgione and Titian.

Besides the Italian masters, there were others on this side the Alps, who had no communication with those of Italy: such were Albert Durer, in Germany; Holbein, in Switzerland; Lucas, in Holland; and others in France and Flanders. But Italy, and particularly Rome, was the place where the art was practised with the greatest success; and where, from time to time, the greatest masters were produced.

To Raphael's school, succeeded that of the Caraccios; which has lasted, in its scholars, almost to the present time.

It is of the different parts of this art thus re-established, extended, and improved, that we are here to treat.

PART I. Principles of the ART, and the Order of the Artist's STUDIES.

SECT. I. *Of the First Exercises of a Painter.*

4. IT is not a matter of so little importance, as some are, perhaps, apt to imagine, upon what drawings a pupil is first put to exercise his talents. Let the first profiles, the first hands, the first feet, given him to copy, be of the best masters, so as to bring his eye and his hand early acquainted with the most elegant forms, and the most beautiful proportions. A youth, employed in copying the work of a middling painter, in order to proceed afterwards to something of Raphael's, having said, in the hearing of a master, That he did it in order to bring his hand in; the master, as sensibly as wittily, replied, "Say rather, to put it out." A painter, who has early acquired a fine style, finds it an easy matter to give dignity to the meanest features, while even the works of a Praxiteles or a Glycon are sure to suffer in the hands of another. A vessel will ever retain the scent which it has first contracted.

It would be proper also to make the pupil copy some fine heads from the Greek and Roman medals: not so much for the reasons just now laid down, as to make him acquainted, if we may use the expression, with those personages which in time he may have occasion to introduce into his pieces; and, above all, to improve him

early in the art of copying from relief. Hence he will learn the rationale of light and shade, and the nature of that *chiar-oscuro*, by which it is, properly speaking, that the various forms of things are distinguished. To this it is owing, that a boy will profit more by drawing after things in relief, though but meanly executed, than by copying the most excellent drawings. But, whatever he does, care should be taken to make him do it with delight, and finish it in the most accurate manner. Nothing in the world is so necessary as diligence; especially at the first entrance upon any study. Nor must he ever expect to have the compasses in his eye, who has not first had them for a long time in his hand.

SECT. II. *Of Anatomy.*

5. To ask if the study of anatomy is requisite to a painter, is the same thing as to ask if, in order to learn any science, a man must first make himself acquainted with the principles of it. It would be throwing away time to cite, in confirmation of this truth, the authorities of the ancient masters, and the most celebrated schools. A man, who is unacquainted with the form and construction of the several bones which support and govern the human frame, and does not know in what manner the muscles moving these bones are fixed to them,

Anatomy.

them, can make nothing of what appears of them thro' the integuments with which they are covered; and which appearance is, however, the noblest object of the pencil. It is impossible for a painter to copy faithfully what he sees, unless he thoroughly understands it. Let him employ ever so much time and study in the attempt; it cannot but be attended with many and great mistakes: just as it must happen to a man, who undertakes to copy something in a language which he does not understand; or to translate into his own, what has been written in another, upon a subject with which he is not acquainted.

It seldom happens, that nothing more is required of a painter than to copy exactly an object which he has before him. In still and very languid attitudes, in which every member is to appear motionless and dead, a living model may, no doubt, yield for a long time a faithful image, and prove an useful pattern to him, But in regard to gestures any way sudden, motions any way violent, or those momentary attitudes which it is more frequently the painter's business to express, the case is quite different. In these a living model can hold but an instant or two; it soon grows languid, and settles into a fixed attitude, which is produced by an instantaneous concurrence of the animal-spirits. If, therefore, a painter possesses not so thoroughly all the principles of anatomy, as to be at all times able to have immediate recourse to them; if he knows not the various manners in which the several parts of the human body play, according to their various positions; living models, far from proving an useful pattern to him, will rather tend to lead him astray, and make him lose sight of truth and nature, by exhibiting the very reverse of what is required, or at least exhibiting it in a very faint and imperfect manner. In living models, we often behold those parts slow, which should be very quick; those cold and torpid, which should have the greatest share of life and spirit in them.

Nor is it, as some may be apt to imagine, merely to represent athletic and vigorous bodies, in which the parts are most bold and determined, that anatomy is requisite: it should be understood, to represent persons of the most delicate frame and condition, even women and children, whose members are smoothest and roundest, though the parts made known by it are not to be strongly expressed in such objects; just as logic is equally requisite under the polished insinuations of the orator and the rough arguments of the philosopher.

But it is needless to spend much time in proving, that a painter should be acquainted with anatomy; or in showing, how far his acquaintance with it should extend. For instance, it is unnecessary for him to enter into the different systems of the nerves, blood-vessels, bowels, and the like; parts which are removed from the sight, and which therefore may be left to the surgeon and the physician, as being a guide in the operations of the former and in the prescriptions of the latter. It is enough for the painter, to be acquainted with the skeleton; in other words, with the figure and connection of the bones, which are, in a manner, the pillars and props of the human body; the origin, progress, and shape, of the muscles, which cover these bones; as also the different degrees in which nature has clothed the muscles with fat,

for this substance lies thicker upon them in some places than in others. Above all, he should know, in what manner the muscles effect the various motions and gestures of the body. A muscle is composed of two tendinous and slender parts, one called the *head*, the other the *tail*, both terminating at the bones; and of an intermediate part, called the *belly*. The action of a muscle consists in an extraordinary swelling of this intermediate part, while the head remains at rest, so as to bring the tail nearer the head, and consequently the part, to which the tail of the muscle is fixed, nearer to that part into which the head is inserted.

There are many motions, to effect which several of the muscles (for this reason called *co-operating muscles*) must swell and operate together, while those calculated to effect a contrary motion (and therefore called *antagonist muscles*) appear soft and flaccid. Thus, for example, the biceps and the brachii internus labour when the arm is to be bent, and become more prominent than usual; while the gemellus, the brachii externus, and the anconæus, whose office is to extend the arm, continue, as it were, flat and idle. The same happens respectively in all the other motions of the body. When the antagonist muscles of any part operate at one and the same time, such part becomes rigid and motionless. This action of the muscle is called *tonic*.

Michael Angelo intended to have given the public a complete treatise upon this subject; and it is no small misfortune, that he never accomplished so useful a design. This great man, having observed, as we are told in his life by Condivi, that Albert Durer was deficient on the subject, as treating only of the various measures and forms of bodies, without saying a word of their attitudes and gestures, though things of much greater importance, resolved to compose a theory, founded upon his long practice, for the service of all future painters and statuary. And, certainly, no one could be better qualified to give anatomical precepts for that purpose, than he, who, in competition with Da Vinci, designed that famous cartoon of naked bodies, which was studied by Raphael himself, and afterwards obtained the approbation of the Vatican, the greatest school of the art we are now treating of.

The want of Michael Angelo's precepts may, in some measure, be supplied by other books written on the same subject by Moro, Cesio, and Tortebat; and lately by Bouchardon, one of the most famous statuary in France. But nothing can be of equal service to a young painter, with the lessons of some able dissector; under whom, in a few months, he may make himself master of every branch of anatomy which he need to be acquainted with. A course of osteology is of no great length; and of the infinite number of muscles discovered by curious myologists, there are not above 80 or 90, with which nature sensibly operates all those motions which he can ever have occasion to imitate or express. These, indeed, he should closely study, these he should carefully store up in his memory, so as never to be at the least loss for their proper figure, situation, office, and motion.

But there is another thing besides the dissection of dead bodies, by which a young painter may profit greatly; and that is, anatomical casts. Of these we have

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have numbers by several authors; nay some, which pass under the name of *Busanarroti* himself. But there is one, in which, above all the rest, the parts are most distinctly and lively expressed. This is the performance of *Hercules Lelli*, who has, perhaps, gone greater lengths in this kind of study than any other master. We have, besides, by the same able hand, some casts of particular parts of the human body, so curiously coloured for the use of young painters, as to represent these parts exactly as they appear on removing the integuments; and thus, by the difference in their colour as well as configuration, render the tendinous and the fleshy parts, the belly and the extremities, of every muscle suprisingly distinct; at the same time that, by the various direction of the fibres, the motion and play of these muscles become very obvious; a work of the greatest use, and never enough to be commended! Perhaps, indeed, it would be an improvement, to give the muscles various tints; those muscles especially, which the pupil might be apt to mistake for others. For example, though the mastoideus, the deltoides, the sartorius, the fascia lata, the gastrocnemii, are, of themselves, sufficiently distinguishable, it is not so with regard to the muscles of the arm and of the back, the right muscles of the belly, and some others, which, either on account of the many parts into which they branch, or of their being interwoven one with another, do not so clearly and fairly present themselves to the eye. But let the cause of confusion to young beginners be what it will, it may be effectually removed by giving, as already hinted, different colours to the different muscles, and illuminating anatomical figures; in the same manner that maps are, in order to enable us readily to distinguish the several provinces of every kingdom, and the several dominions of every prince.

The better to understand the general effect, and remember the number, situation, and play of the muscles, it will be proper to compare, now and then, the anatomical casts, and even the dead body itself, with the living body covered with its fat and skin; and above all things, with the Greek statues still in being. It was the peculiar happiness of the Greeks, to be able to characterize and express the several parts of the human body much better than we can pretend to do; and this, on account of their particular application to the study of naked figures, especially the fine living ones which they had continually before their eyes. It is well known, that the muscles most used are likewise the most protuberant and conspicuous; such as, in those who dance much, the muscles of the legs; and in boatmen, the muscles of the back and arms. But the bodies of the Grecian youth, by means of their constant exertion of them in all the gymnastic sports, were so thoroughly exercised, as to supply the statuary with much more perfect models than ours can pretend to be. It is not to be doubted, but that, for the same reason, the Greek painters attained the highest degree of perfection in the figures of those pieces of theirs so much cried up by ancient authors; and it is a great pity, that we have not even those copies of nature to direct our studies. For the faults observable in the ancient paintings, which have been dug up in great numbers, especially within these few years, do not so much tend to prove that the

Greeks were any way deficient in this art, as the pieces themselves, taken all together, that they had carried it to the highest degree of perfection. For, if in pictures drawn upon walls, which it was therefore impossible to rescue from fire, and in little country towns, and at a time when the art was at its lowest ebb, there appears, in the opinion of the best judges, such excellence of design, colouring, and composition, that one would apt to attribute most of them to the school of *Raphael*; what must we think of the pictures, drawn at an earlier period, by their ablest masters and for their most flourishing cities and most powerful monarchs; of pictures admired in a country like Greece, where every art was brought to such a degree of perfection, that no passion could resist their music, no sentiment resist their mimic arts; of pictures cried up by *Pliny**, the soundness of whose judgment in matters of this kind displays itself in so many passages of his works; collected at such expence by *Julius Cæsar*†, of whose fine taste, the works composed by him, and still extant, are a most incontestable proof? But what evinces still better the excellence of the ancients in painting, is that to which they arrived in statuary, her sister art. Both daughters of design, they both enjoyed in common the same models, which, more perfect in the happy climate of Greece than in any other part of the globe, must have been of as great service to the *Apelles* and the *Zeuxiles*, in the drawing of their figures, as they were to the *Apolloniuses*, the *Glycons*, and the *Agathes*, in carving those statues which the world has still the happiness of possessing. These masters, being besides assisted by a proper insight into anatomy, and thoroughly acquainted with the various play of the muscles according to the various attitudes of the body, and with the different degrees of strength with which each particular muscle was to be expressed in each particular attitude, were thereby enabled to give truth, motion, and life, to all their works.

There are a great many exercises, which a young painter should go through while engaged in the study of anatomy, in order to make himself more thoroughly master of that science. For example: The thighs of any figure, a *Laocoon* for instance, being given, he should add to them legs suitable to that state in which the muscles of the thighs are represented, that is, the muscles which serve to bend and extend the legs, and to effectuate in them such a precise position and no other. To the simple contour of an anatome, or a statue, he should add the parts included by it, and give it a system of muscles conformable to the quality of that particular contour; for every contour denotes some one certain attitude, motion, exertion, and no other. Exercises of this kind would soon establish him in the most fundamental principles of painting, especially if he had an opportunity of comparing his drawings with the statue or cast from which the parts given him to work upon were taken, and thereby discovering and correcting his mistakes. This method is very like that used by those who teach the Latin tongue; when, having given their scholars a passage of *Livy* or *Cæsar* already translated into their mother-tongue, to translate back into Latin, they make them compare their work with the original next.

SECT. III. Of Perspective.

6. THE study of perspective should go hand in hand

* Nat. Hist.
lib. xxxvi.
c. 25.
† Suetonius
in vit. Cæs.
cap. 27.

Perspective. with that of anatomy, as not less fundamental and necessary. In fact, the contour of an object drawn upon paper or canvas, represents nothing more than such an intersection of the visual rays sent from the extremities of it to the eye, as would arise on a glass put in the place of the paper or canvas. Now, the situation of an object at the other side of a glass being given, the delineation of it on the glass itself depends entirely on the situation of the eye on this side of the glass; that is to say, on the rules of perspective: a science which, contrary to the opinion of most people, extends much farther than the painting of scenes, floors, and what generally goes under the name of *quadratura*. Perspective, according to that great master da Vinci, is to be considered as the reins and rudder of painting. It teaches in what proportion the parts fly from, and lessen upon, the eye; how figures are to be marshalled upon a plain surface, and fore-shortened. It contains, in short, the whole rationale of design.

Such are the terms which the masters best grounded in their profession have employed to define and commend perspective: so far were they from calling it a *fallacious art*, and an *insidious guide*; as some amongst the moderns have not blushed to do, insinuating that it is to be followed no longer than it keeps the high road, or leads by easy and pleasant paths. But these writers plainly show, that they are equally ignorant of the nature of perspective, which, founded as it is on geometrical principles, can never lead its votaries astray; and of the nature of their art, which, without the assistance of perspective, cannot, in rigour, expect to make any progress, nay, not so much as delineate a simple contour.

Those, too, who would persuade us, that the ancient masters of Greece knew nothing of perspective, show, that they themselves know little or nothing of painting. They allege, as a proof of this their idle assertion, that the rules of perspective are violated in the most of the ancient pictures that have reached us; as though the mistakes and blunders of middling artists were a sufficient ground for calling in question the merit of others, who were allowed to excel in their profession. Now, not to insist on the absurdity of such a supposition, which we have already exposed, Pamphilus, the master of Apelles, and the founder of the noblest school of all Greece, has affirmed in the most express terms, that, without geometry, painting must fall to the ground †. It is well known, besides, that the ancients practised the art of painting in perspective upon walls, in the same way that it is now done * *Vitruvius*, by the moderns ‡; and that one of the walls of the theatre of Claudius Pulcher, representing a roof covered with tiles, was finished in so masterly a manner, that the rooks, a bird of no small sagacity, taking it for a real roof, often attempted to alight upon it †. We are likewise told, that a dog was deceived to such a degree, by certain steps in a perspective of Dento's, that, expecting to find a free passage, he made up to them in full speed, and dashed out his brains; thus immortalizing by his death the pencil of the artist, which had been the occasion of it. But, what is still more, *Vitruvius* ‖ tells us in express terms, by whom, and at what time, this art was invented. It was first practised by Agatharcus, a contemporary of *Æschylus*,

in the theatre of Athens; and afterwards reduced to Perspective, certain principles; and treated as a science, by Anaxagoras and Democritus; thus faring like all other arts, which existed in practice before they appeared in theory. The thing, perhaps, may be thus accounted for. Some painter, who happened to be a very accurate observer of nature, first exactly represented those effects which he saw constantly attend the images offered to our eyes by exterior objects; and these effects came afterwards to be demonstrated by geometricians as so many necessary consequences, and reduced to certain theorems: just as from those chef d'œuvres of the human mind, the *Iliad* of Homer, and *Oedipus* of Sophocles, both built upon the most accurate observations of nature, Aristotle found means to extract the rules and precepts contained in his art of poetry. It is therefore clear, that, so early as the age of Pericles, perspective was reduced into a complete science; which no longer continued confined to the theatre, but made its way into the schools of painting, as an art not less necessary to painters in general, than it had been found to scene-painters in particular. Pamphilus, who founded in Scion the most flourishing school of design, taught it publicly; and from the time of Apelles, Protogenes, and the other bright luminaries of painting amongst the ancients, it was practised by the Greek painters, in the same manner that it was, so many ages after, by Bellini, Pietro Perugino, and others, down to the days of Titian, Raphael, and Corregio, who put the last hand to painting, and gave it all that perfection it was capable of receiving.

Now, a painter having formed a scene in his mind, and supposed, as it is customary, that the capital figures of this scene lie close, or almost close, to the back of his canvas, he is, in the next place, to fix upon some point on this side of the canvas, from which he would choose his piece should be seen. But in choosing this point, which is called the *point of sight*, regard should be had to its situation to the right or left of the middle of the canvas: but, above all things, to its distance and its height with respect to the lower edge of the canvas; which edge is called the *base line*, and is parallel with the horizontal line that passes through the eye. For by assuming the point of sight, and consequently the horizontal line, too low, the planes, upon which the figures stand, will appear a great deal too shallow; as, by assuming it too high, they will appear too steep, so as to render the piece far less light and airy than it ought to be. In like manner, if the point of sight is taken at too great a distance from the canvas, the figures will not admit of degradation enough to be seen with sufficient distinctness; and if taken too near it, the degradation will be too quick and precipitate to have an agreeable effect. Thus, then, it appears, that no small attention is requisite in the choice of this point.

When a picture is to be placed on high, the point of sight should be assumed low, and *vice versa*; in order that the horizontal line of the picture may be, as near as possible, in the same horizontal plane with that of the spectator; for this disposition has an amazing effect. When a picture is to be placed very high, as, amongst many others, that of the purification by Paolo Veronese, engraved by le Fèvre, it will be proper

† *Plin.*
Nat. Hist.
lib. xxxv.
c. 10.
* *Vitruvius*,
lib. vii. c. 5.

‡ *Plin.*
Nat. Hist.
lib. xxxv.
c. 4.

‖ *Ta. Pref.*
lib. vii.

Perspective. to assume the point of sight so low, that it may lie quite under the picture, no part of whose ground is, in that case, to be visible; for, were the point of sight to be taken above the picture, the horizontal ground of it would appear sloping to the eye, and both figures and buildings as ready to tumble head foremost. It is true, indeed, that there is seldom any necessity for such extraordinary exactness; and that, unless in some particular cases, the point of sight had better be rather high than low: the reason of which is, that, as we are more accustomed to behold people on the same plane with ourselves, than either higher or lower, the figures of a piece must strike us most when standing on a plane nearly level with that upon which we ourselves stand. To this it may be added, that by placing the eye low, and greatly shortening the plane, the heels of the back figures will seem to bear against the heads of the foremost, so as to render the distance between them far less perceptible than otherwise it would be.

The point of sight being fixed upon, according to the situation in which the picture is to be placed, the point of distance is next to be determined. In doing this, a painter should carefully attend to three things: first, that the spectator may be able to take in, at one glance, the whole and every part of the composition; secondly, that he may see it distinctly; and thirdly, that the degradation of the figures and other objects of the picture be sufficiently sensible. It would take up too much time to lay down certain and precise rules for doing all this, considering the great variety in the sizes and shapes of pictures; for which reason we must leave a great deal to the discretion of the painter.

But there is a point still remaining, which will not admit of the least latitude. This is, the delineation of the picture, when once the point of sight has been fixed upon. The figures of a picture are to be considered as so many columns erected on different spots of the same plane; and the painter must not think of designing any thing, till he has laid down, in perspective, all those columns which are to enter his composition, with the most scrupulous exactness. By proceeding in this manner, he may not only be sure of not committing any mistake in the diminution of his figures according to their different distances, but may flatter himself with the thoughts of treading in the steps of the greatest masters, especially Raphael, in whose sketches (such was his respect to the laws of perspective) we frequently meet with a scale of degradation. It is to the punctual observance of these laws, that we are to attribute the grand effect of some paintings by Carpazio and Mantegna, so careless in other respects; whereas a single fault against them is often sufficient entirely to spoil the works of a Guido, in spite of the sublimity and beauty of his superior style.

Now, as the demonstration of the rules of perspective depends on the doctrine of proportions, on the properties of similar triangles, and on the intersection of planes, it will be proper to put an abridgement of Euclid into the hands of the young painter, that he may understand these rules fundamentally, and not stand confined to a blind practice of them: but, then, there is nothing in this author, relative to the art of paint-

ing, which may not be easily acquired in a few months. For, as it would be of no use to a painter to lanch out into the anatomical depths of a Monro or an Albinus, it would be equally superfluous to perplex himself with the intricacies of the higher geometry with a Taylor, who has handled perspective with that rich profoundness, which we cannot help thinking does a great deal more honour to a mathematician, than it can possibly bring advantage to a simple artist.

But though a much longer time were requisite to become a perfect master of perspective, a painter, surely, ought not to grudge it; as no time can be too long to acquire that knowledge, without which he cannot possibly expect to succeed. Nay, we may boldly affirm, that the shortest road in every art is that which leads through theory to practice. It is from theory that arises that great facility, by means of which a man advances the quicker, in proportion as he is surer of not taking a wrong step: whilst those, who are not grounded in the science, labour on in perpetual doubt; obliged, as a certain author expresses it, to feel out their way with a pencil, just as the blind, with their sticks, feel for the streets and turnings, with which they are not acquainted.

As practice, therefore, ought in every thing to be built upon principle, the study of Optics, as far as it is requisite to determine the degree in which objects are to be illuminated or shaded, should proceed hand in hand with that of perspective: And this, in order that the shades, cast by figures upon the planes on which they stand, may fall properly, and be neither too strong nor too light; in a word, that those most beautiful effects of the chiar-oscuro may run no risk of ever receiving the lie from truth, which sooner or later discovers itself to every eye.

SECT. IV. Of Symmetry.

7. THE study of symmetry, it is obvious, should immediately follow that of anatomy: for it would avail little to be acquainted with the different parts of the human body, and their several offices, were we at the same time ignorant of the order and proportion of these parts in regard to the whole in general, and each other in particular. The Greek statuary distinguished themselves above all others, as much by the just symmetry of their members, as by their skill in anatomy; but Polyceutes surpassed them all by a statue, called the *Rule*, from which, as from a most accurate pattern, other artists might take measures for every part of the human body. These measures, to say nothing of the books which treat professedly of them, may now be derived from the Apollo of Belvedere, the Laocoon, the Venus of Medicis, the Fannus, and particularly the Antinous, which last was the rule of the learned Poussin.

Nature, which in the formation of every species seems to have aimed at the last degree of perfection, does not appear to have been equally solicitous in the production of individuals. She considers, one would think, those things as nothing, which have a beginning and an end, and whose existence is of so short a duration, that they may be said, in a manner, to come into the world merely to leave it. She seems, in some sort, to abandon individuals to second causes; and if

from.

Symmetry.

† In *Galeria*. See also the *Life of Zeuxis*, by Carlo Dati, note 11.

from them there now and then breaks forth a primitive ray of perfection, it is too soon eclipsed by the clouds of imperfection that constantly attend it. Now, Art soars up to the archtypes of Nature; collects the flowers of every beauty, which it here and there meets with; combines all the perfect models that come in its way; and propoſes them to men for their imitation. Thus, the painter, who had before him a company of naked Calabrian girls, traced, as la Casa † ingeniously expreſſes it, the reſpective beauties which they had as it were borrowed from one ſingle body; that, by making each of them reſtore to this imaginary form what he had borrowed from it, he might be furniſhed with a complete pattern; rightly imagining, that from ſuch an union, and of ſuch beauties, muſt reſult the beauty of an Helen. This was likewiſe the practice of the ancient ſtatuiers, when about to form in braſs or marble the ſtatues of their gods or heroes. And, thanks to the hardneſs of theſe materials, ſome of their works, containing united all that poſſible perfection which could be found ſcattered here and there in individuals, ſubſiſt to this day as patterns not only of exact ſymmetry, but of ſuper eminent grandeur in the parts, graceſulneſs and contraſt in the attitudes; in ſhort, as paragons in every kind, and the very mirrors of beauty. In them we behold precept joined with example: in them we ſee where the great maſters of antiquity deviated with a happy boldneſs from the common rules; or rather made them bend to the different characters they were to repreſent. In their Niobe, for inſtance, which was to breathe majeſty like Juno, they have altered ſome parts that appear more delicate and ſlender in their Venus, the pattern of female beauty. The legs and thighs of the Apollo of Belvedere, by being made ſomewhat longer than the common proportion of theſe limbs to the reſt of the body ſeems to admit, contribute not a little to give him that eaſe and freedom which correſpond ſo well with the activity attributed to that deity; as, on the other hand, the extraordinary thickneſs of the neck adds ſtrength to the Farnelian Hercules, and gives him ſomething of a bull-like look and robuſtneſs.

It is the general opinion of painters, that the ancients were not as happy in repreſenting the bodies of children, as they are allowed to have been in repreſenting thoſe of women and men; eſpecially thoſe of their gods; in which they excelled to ſuch a degree, that with theſe gods were often worſhipped the artiſts who had carved them. Yet the Venus of Gnibus by Praxiteles was not more famous than her Cupid, on whoſe account alone people flock'd to Thepiæ †. To children, ſay they, the ancients knew not how to impart that ſoftneſs and effeminacy, which Piamingo has ſince contriv'd to give them, by repreſenting their cheeks, hands, and feet, ſwell'd, their heads large, and with ſcarce any belly. But ſuch critics ſeem to forget, that theſe firſt ſketches of nature very ſeldom come in the painter's way, and that this puny and delicate ſtate has not in its form even the leaſt glimmering of perfection. The ancients never undertook to repreſent children leſs than four or five years old; at which age the ſuperfluous humours of the body being in ſome meaſure digeſted, their members begin to aſſume ſuch a contour and proportion, as may ſerve to point out what they are afterwards likely to

be. This obſervation is confirm'd by the children Symmetry, which we meet with in ancient baſſo-relievos and paintings: for they are all doing one thing or another; like thoſe moſt beautiful little Cupids in a picture at Venice, who are playing with the arms of Mars, and lifting up the ponderous ſword of that deity; or that little urchin in the Danæe of Caracci, who empties a quiver of its arrows, in order to fill it with the golden ſhower. Now, what can be a greater blunder in point of coſtume, than to attribute actions, which require ſome degree of ſtrength and judgment, to infancy, to that raw and tender age ſo totally unable to govern and ſupport itſelf?

Let a young painter conſider the Greek ſtatues ever ſo often, of whatever character or age they may be repreſented, it is impoſſible he ſhould ever conſider them without diſcovering new beauties in them. It is therefore impoſſible he ſhould copy them too often, according to that judicious motto plac'd by Moratti on his print call'd *The ſchool*. This truth was acknowledged by Rubens himſelf: for though, like one bred, as he was, in the foggy climate of the Low Countries, he generally painted from the life; in ſome of his works he copied the ancients; nay, he wrote a treatiſe on the excellency of the ancient ſtatues, and on the duty of a painter to ſtudy and imitate them. As to the ſatirical print, or rather paſquinade, of the great Titian, in which he has repreſented a parcel of young monkeys aping the groupe of Laocoon and his ſons; he intended nothing more by it than to laſh the dulneſs and poverty of thoſe artiſts, who cannot ſo much as draw a figure without having a ſtatue before them as a model.

In fact, reaſon requires, that an artiſt ſhould be ſo much maſter of his art, as ſeldom to ſtand in need of a pattern. To what other purpoſe is he to ſweat and toil from his infancy, and ſpend ſo many days and nights in ſtudying and copying the beſt models; eſpecially the fineſt faces of antiquity, which we are ſtill poſſeſſ'd of; ſuch as the two Niobes, mother and daughter; the Ariadne, the Alexander, the young Nero, the Silenus, the Nile; and likewiſe the fineſt figures; for inſtance, the Apollo, the Gladiator, the Venus, and others; all which (as was ſaid of Pietro Felſa), he ſhould have, as it were, perfectly by heart? With a ſtock of excellencies like theſe, treaſured up in his memory, he may one day hope to produce ſomething of his own without a model; form a right judgement of thoſe natural beauties which fall in his way; and, when occaſion offers, avail himſelf properly of them.

It is very ill done to ſend boys to an academy to draw after naked figures, before they have imbib'd a proper reliſh for beautiful proportions, and have been well-grounded in the true principles of ſymmetry. They ſhould firſt learn, by ſtudying the precious remains of antiquity, to improve upon life; and diſcern where a natural figure is faulty through ſtiffneſs in the members, or clumlineſs in the trunk, or in any other reſpect; ſo as to be able to correct the faulty part, and reduce it to its proper bounds. Painting, in this branch, is, like medicine, the art of taking away and adding.

It muſt not, however, be diſſembled, that the methods hitherto laid down are attended with ſome danger;

4 Clie. in Porreum, ſignis. lib. ix. Plin. Nat. Hiſt. lib. xxxvii. c. 5.

Symmetry. ger: for by too slavish an attention to statues, the young painter may contract a hard and dry manner; and by studying anatomies too servilely, a habit of representing living bodies as stripped of their skin: for, after all, there is nothing but what is natural, that, besides a certain peculiar grace and liveliness, possesses that simplicity, ease, and softness, which is not to be expected in the works of art, or even in those of nature when deprived of life. Poussin himself has now and then given into one of these extremes, and Michael Angelo very often into the other: but from this we can only infer, that even the greatest men are not infallible. It is, in short, to be considered as one instance, among a thousand, of the ill use those are wont to make of the best things, who do not know how to temper and qualify them properly with their contraries.

But no such danger can arise to a young painter from confining himself for a long time to mere design, so as not to attempt colouring till he has made himself master of that branch. If, according to a great master †, colours in painting are in regard to the eye what numbers in poetry are in regard to the ear, so many charms to allure and captivate that sense; may we not affirm, that design is in the same art what propriety of language is in writing, and a just utterance of sounds in music? Whatever some people may think, a picture designed according to the rules of perspective and the principles of anatomy, will ever be held in higher esteem by good judges, than a picture ill designed, let it be ever so well coloured. Annibal Caracci set so great a value upon the art of contour, that, according to some expressions of his which have reached us, he considered almost every thing else as nothing in comparison with it. And this his judgment may be justified, by considering, that nature, though she forms men of various colours and complexions, never operates in their motions contrary to the mechanical principles of anatomy, nor, in exhibiting these motions to the eye, against the geometrical laws of perspective: a plain proof, that, in point of design, no mistake is to be deemed trifling. Hence we are enabled to feel all the weight of those words in which Michael Angelo, after he considered a picture drawn by a prince of the Venetian school, addressed Vasari: "What a pity it is," said he, "that this man did not set out by studying design!" As the energy of nature shines most in the smallest subjects, so the energy of art shines most in imitating them.

SECT. V. Of Colouring.

8. It must likewise be of great service to a painter desirous to excel in colouring, to be well acquainted with that part of Optics which has the nature of light and colours for its object. Light, however simple and uncompounded it may appear, is nevertheless made up, as it were, of several distinct substances; and the number, and even dose, of these ingredients, has been happily discovered by the moderns. Every undivided ray, let it be ever so fine, is a little bundle of red, orange, yellow, green, azure, indigo, and violet rays, which, while combined, are not to be distinguished one from another, and from that kind of light called *white*; so that white is not a colour *per se*, as the learned da Vinci † (so far, it seems, the precursor of Newton) expressly affirms, but an assemblage of colours. Now, these

colours, which compose light, although immutable in themselves, and endued with various qualities, are continually, however, separating from each other in their reflection from and passage through other substances, and thus become manifest to the eye. Grains, for example, reflects only green rays, or rather reflects green rays in greater number than it does those of any other colour; and one kind of wine transmits red rays, and another yellowish rays: and from this kind of separation arises that variety of colours with which nature has diversified her various productions. Man, too, has contrived to separate the rays of light by making a portion of the sun's beams pass through a glass prism; for after passing through it, they appear divided into several pure and primitive colours, placed in succession one by the other, like so many colours on a painter's pallet.

Now, though Titian, Correggio, and Vandyke, have been excellent colourists, without knowing any thing of these physical subtleties, that is no reason why others should neglect them. For it cannot but be of great service to a painter to be well acquainted with the nature of what he is to imitate, and of those colours with which he is to give life and perfection to his designs; not to speak of the pleasure there is in being able to account truly and solidly for the various effects and appearances of light. From a due tempering, for example, and degrading, of the tints in a picture; from making colours partake of each other, according to the reflection of light from one object to another; there arises, in some measure, that sublime harmony which may be considered as the true music of the eye. And this harmony has its foundation in the genuine principles of optics. Now this could not happen in the system of those philosophers, who held, that colours did not originally exist in light, but were, on the contrary, nothing else than so many modifications which it underwent in reflecting from or passing through other substances; thus subject to alterations without end, and every moment liable to perish. Were that the case, bodies could no more receive any hues one from another, nor this body partake of the colour of that, than scarlet, for example, because it has the power of changing into red all the rays of the sun or sky which immediately fall upon it, has the power of changing into red all the other rays reflected to it from a blue or any other colour in its neighbourhood. Whereas, allowing that colours are in their own nature immutable one into another, and that every body reflects more or less every sort of coloured rays, though those rays in the greatest number which are of the colour it exhibits, there must necessarily arise, in colours placed near one another, certain particular hues or temperaments of colour: nay, this influence of one colour upon another may be so far traced, that three or four bodies of different colours, and likewise the intenseness of the light falling upon each, being assigned, we may easily determine in what situations, and how much, they would tinge each other. We may thus, too, by the same principle of optics, account for several other things practised by painters; inasmuch that a person, who has carefully observed natural effects with an eye directed by solid learning, shall be able to form general rules, where another can only distinguish particular cases.

But after all, the pictures of the best colourists are,

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† Poussin; in his *Life*, by Bellori.

† Trattato della Pittura, c. 14.

Colouring.—it is universally allowed, the books in which a young painter must chiefly look for the rules of colouring; that is, of that branch of painting which contributes so much to express the beauty of objects, and is so requisite to represent them as what they really are. Giorgione and Titian seem to have discovered circumstances in nature, which others have entirely overlooked; and the last in particular has been happy enough to express them with a pencil as delicate as his eye was quick and piercing. In his works we behold that sweetness of colouring which is produced by union; that beauty which is consistent with truth; and all the insensible transmutations, all the soft transitions, in a word, all the pleasing modulations, of tints and colours. When a young painter has, by close application, acquired from Titian, whom he can never sufficiently dwell upon, that art which, of all painters, he has best contrived to hide, he would do well to turn to Bassano and Paolo, on account of the beauty, boldness, and elegance of their touches. That richness, softness, and freshness of colouring, for which the Lombard school is so justly cried up, may likewise be of great service to him. Nor will he reap less benefit by studying the principles and practice of the Flemish school; which, chiefly by means of her varnishes, has contrived to give a most enchanting lustre and transparency to her colours.

But whatever pictures a young painter may choose to study the art of colouring upon, he must take great care that they are well preserved. There are very few pieces which have not suffered more or less by the length, not to say the injuries, of time; and perhaps that precious patina, which years alone can impart to paintings, is in some measure akin to that other kind which ages alone impart to medals; inasmuch as, by giving testimony to their antiquity, it renders them proportionably beautiful in the superstitious eyes of the learned. It must indeed be allowed, that if, on the one hand, this patina bestows, as it really does, an extraordinary degree of harmony upon the colours of a picture, and destroys, or at least greatly lessens, their original rawness, it, on the other hand, equally impairs the freshness and life of them. A piece seen many years after it has been painted, appears much as it would do, immediately after painting, behind a dull glass. It is no idle opinion, that Paolo Veronese, attentive above all things to the beauty of his colours, and what is called *scintillo*, left entirely to time the care of harmonizing them perfectly and (as we may say) mellowing them. But most of the old masters took that task upon themselves; and never exposed their works to the eyes of the public, until they had ripened and finished them with their own hands. And who can say whether the *Christ* of Moneta, or the *Nativity* of Bassano, have been more improved or injured (if we may so speak) by the touchings and retouchings of time, in the course of more than two centuries? It is indeed impossible to be determined. But the studious pupil may make himself ample amends for any injuries which his originals may have received from the hands of time, by turning to truth, and to Nature which never grows old, but constantly retains its primitive flower of youth, and was itself the model of the models before him. As soon, therefore, as a young painter has laid a proper foundation for good colouring, by studying the best

masters, he should turn all his thoughts to truth and nature. And it would perhaps be well worth while to have, in the academies of painting, models for colouring as well as designing; that as from the one the pupils learn to give their due proportion to the several members and muscles, they may learn from the other to make their carnations rich and warm, and faithfully copy the different local hues which appear quite distinct in the different parts of a fine body. To illustrate still farther the use of such a model, let us suppose it placed in different lights; now in that of the sun, now in that of the sky, and now again in that of a lamp or candle; one time placed in the shade, and another in a reflected light. Hence the pupil may learn all the different effects of the completion in different circumstances, whether the livid, the lucid, or transparent; and, above all, that variety of tints and half-tints, occasioned in the colour of the skin by the epidermis having the bones immediately under it in some places, and in others a greater or less number of blood-vessels or quantity of fat. An artist who had long studied such a model, would run no risk of degrading the beauties of nature by any particularity of style, or of giving into that preposterous fulness and floridness of colour which is at present so much the taste. He would not feed his figures with roses, as an ancient painter of Greece shrewdly expressed it, but with good beef; a difference, which the learned eye of a modern writer *Wobb*, could perceive between the colouring of Barocci and dial. 1. that of Titian. To practise, in that manner, is, according to a great master, no better than inuring one's self to the commission of blunders. What statues are in design, nature is in colouring; the fountain-head of that perfection to which every artist, ambitious to excel, should constantly aspire: and accordingly the Flemish painters, in consequence of their aiming solely to copy nature, are in colouring as excellent as they are wont to be awkward in designing.

SECT. VI. Of the Camera Obscura.

9. We may well imagine, that could a young painter but view a picture by the hand of nature herself, and study it at his leisure, he would profit more by it than by the most excellent performances by the hand of man. Now, nature is continually forming such pictures in our eye. The rays of light coming from exterior objects, after entering the pupil pass through the crystalline humour; and, being there refracted in consequence of the lenticular form of that part, proceed to the retina, which lies at the bottom of the eye, and stamp up it, by their union, the image of the object towards which the pupil is directed. The consequence of which is, that the soul, by means as yet unknown to us, receives immediate intelligence of these rays, and comes to see the objects that sent them. But this grand operation of nature, the discovery of which was reserved for our times, might have remained an idle amusement of physical curiosity, without being of the least service to the painter, had not means been happily found of imitating it. The machine contrived for this purpose, consists of a lens and mirror so situated, that the second throws the picture of any thing properly exposed to the first, and that too of a competent largeness, on a clean sheet of paper, where it may be seen and contemplated at leisure.

As this artificial eye, usually called a *camera optica* or *obscura*, gives no admittance to any rays of light, but those coming from the thing whose representation is wanted, there results from them a picture of inexpressible force and brightness; and as nothing is more delightful to behold, so nothing can be more useful to study, than such a picture. For, not to speak of the justness of the contours, the exactness of the perspective and of the chiaroscuro, which exceeds conception; the colours are of a vivacity and richness that nothing can excel; the parts which stand out most, and are most exposed to the light, appear surprisngly loose and resplendent; and this looseness and resplendency declines gradually, as the parts themselves sink in, or retire from the light. The shades are strong without harshness, and the contours precise without being sharp. Wherever any reflected light falls, there appears, in consequence of it, an infinite variety of tints, which, without this contrivance, it would be impossible to discern. Yet there prevails such a harmony amongst all the colours of the piece, that scarce any one of them can be said to clash with another.

After all, it is no way surprisng, that we should, by means of this contrivance, discover, what otherwise we might justly despair of ever being acquainted with. We cannot look directly at any object that is not surrounded by so many others, all darting their rays together into our eyes, that it is impossible we should distinguish all the different modulations of its light and colours. At least we can only fee them in so dull and confused a manner, as not to be able to determine any thing precisely about them. Whereas, in the camera obscura, the visual faculty is brought wholly to bear upon the object before it; and the light of every other object is, as it were, perfectly extinguished.

Another most astonishing perfection in pictures of this kind is, the diminution of the size, and of the intenseness of light and colour, of the objects and all their parts, in proportion to their distance from the eye. At a greater distance, the colours appear more faint, and the contours more obscure. The shades, likewise, are a great deal weaker in a less or more remote light. On the other hand, those objects, which are largest in themselves, or lie nearest to the eye, have the most exact contours, the strongest shades, and the brightest colours: all which qualities are requisite to form that kind of perspective which is called *aerial*; as though the air between the eye and external objects, not only veiled them a little, but in some fort gnawed and preyed upon them. This kind of perspective constitutes a principal part of that branch of painting, which regards the foreshortening of figures, and likewise the bringing them forward, and throwing them back in such a manner as to make us lose sight of the ground upon which they are drawn. It is, in a word, this kind of perspective, from which, assisted by linear perspective, arise

Dolce cosa a vedere, e dolci inganni;

“Things sweet to see, and sweet deceptions.”

Nothing proves this better than the camera obscura, in which nature paints the objects which lie near the eye, as it were, with a hard and sharp pencil, and those at a distance with a soft and blunt one.

The best modern painters among the Italians have availed themselves greatly of this contrivance; nor is it possible they should have otherwise represented things

so much to the life. It is probable, too, that several of the Tramontane masters, considering their success in expressing the minutest objects, have done the same. Every one knows of what service it has been to Spagnoletto of Bologna, some of whose pictures have a grand and most wonderful effect. We once happened to be present where a very able master was shewn this machine for the first time. It is impossible to express the pleasure he took in examining it. The more he considered it, the more he seemed to be charmed with it. In short, after trying it a thousand different ways, and with a thousand different models, he candidly confessed, that nothing could compare with the pictures of so excellent and inimitable a master. Another, no less eminent, has given it as his opinion, that an academy, with no other furniture than the book of da Vinci, a critical account of the excellencies of the capital painters, the casts of the finest Greek statues, and the pictures of the camera obscura, would alone be sufficient to revive the art of painting. Let the young painter, therefore, begin as early as possible to study these divine pictures, and study them all the days of his life, for he never will be able sufficiently to contemplate them. In short, painters should make the same use of the camera obscura which naturalists and astronomers make of the microscope and telescope; for all these instruments equally contribute to make known and represent nature.

SECT. VII. Of Drapery.

10. DRAPERY is one of the most important branches of the whole art, and accordingly demands the greatest attention and study. It seldom happens that a painter has nothing but naked figures to represent; nay, his subjects generally consist of figures clothed from head to foot. Now the flowing of the folds in every garment depends chiefly upon the relief of the parts that lie under it. A certain author, we forget his name, observes, that as the inequalities of a surface are discoverable by the inequalities in the water that runs over it, so the posture and shape of the members must be discernible by the folds of the garment that covers them. Those idle windings and gatherings, with which some painters have affected to cover their figures, make the clothes made up of them look as if the body had fled from under them, and left nothing in its place but a heap of empty bubbles, fit emblems of the brain that conceived them. As from the trunk of a tree there issue here and there boughs of various forms, so from one mistress-fold there always flow many lesser ones: and as it is on the quality of the tree that the elegance, compactness, or openness of its branches chiefly depends; it is, in like manner, by the quality of the stuff of which a garment is made, that the number, order, and size of its folds must be determined. To sum up all in two words, the drapery ought to be natural and easy, so as to show what stuff it is, and what parts it covers. It ought, as a certain author expresses it, to cover the body, as it were merely to show it.

It was formerly the custom with some of our masters to draw all their figures naked, and then drape them; from the same principle that they first drew the skeletons of their figures, and afterwards covered them with muscles. And it was by proceeding in this manner that they attained to such a degree of truth in expres-

fining the folds of their drapery, and the joints and direction of the principal members that lay under it, so as to exhibit in a most striking manner, the attitude of the person to whom they belonged. That the ancient sculptors clothed their statues with equal truth and grace, appears from many of them that are still in being; particularly a Flora lately dug up in Rome, whose drapery is executed with so much judgment, and in so grand and rich a style, that it may vie with the finest of their naked statues, even with the Venus of Medicis. The statues of the ancients had so much beauty when naked, that they retained a great deal when clothed. But here it must be considered, that it was usual with them to suppose their originals clothed with wet garments, and of an extreme fineness and delicacy, that, by lying close to the parts, and in a manner clinging to them, they might the better show what these parts were. For this reason a painter is not to confine himself to the study of the ancient statues, lest he should contract a dry style, and even fall into the same faults with some great masters who, accustomed to drape with such light stuffs as sit close to the body, have afterwards made the coarsest lie in the same manner, so as plainly to exhibit the muscles underneath them. It is therefore proper to study nature herself, and those modern masters who have come nearest to her in this branch; such as Paolo Veronese, Andrea del Sarto, Rubens, and above all, Guido Reni. The flow of their drapery is soft and gentle; and the gatherings and plaits are so contrived, as not only not to hide the body, but to add grace and dignity to it. Their gold, silk, and woollen stuffs, are so distinguishable one from another, by the quality of their several lustres, and the peculiar light and shade belonging to each, but above all by the form and flow of their folds, that the age and sex of their figures are hardly more discoverable by their faces. Albert Durer is another great master in this branch, inasmuch that Guido himself was not ashamed to study him. There are still extant several drawings made with the pen by this great man, in which he has copied whole figures from Albert, and scrupulously retained the flow of his drapery as far as his own peculiar style, less harsh and sharp, but more easy and graceful, would allow. It may be said that he made the same use of Albert, that our modern writers ought to make of the best authors of the 13th century.

SECT. VIII. Of Landscape and Architecture.

11. WHEN our young painter has made a sufficient progress in those principal branches of his art, the designing, perspective, colouring, and drapery of human figures, he should turn his thoughts to landscape and architecture: for, by studying them, he will render himself universal, and qualified to undertake any subject; so as not to resemble certain literati, who, though great masters in some articles, are mere children in every thing else.

The most eminent landscape painters are Poussin, Lorraine, and Titian.

Poussin was remarkable for his great diligence. His pieces are quite exotic and uncommon; being set off with buildings in a beautiful but singular style; and with learned episodes, such as poets reciting their verses to the woods, and youths exercising themselves in the

several gymnastic games of antiquity; by which it plainly appears, that he was more indebted for his subjects to the descriptions of Pausanias, than to nature and truth.

Lorraine applied himself chiefly to express the various phenomena of light, especially those perceivable in the heavens. And, thanks to the happy climate of Rome, where he studied and exercised his talents, he has left us the brightest skies, and the richest and most gloriously cloud-tipt horizons that can be well conceived. Nay, the sun himself, which, like the Almighty, can be represented merely by his effects, has scarce escaped his daring and ambitious pencil.

Titian, the great confidant of nature, is the Homer of landscape. His scenes have so much truth, so much variety, and such a bloom in them, that it is impossible to behold them, without wishing, as if they were real, to make an excursion into them. And perhaps the finest landscape that ever issued from mortal hands, is the back ground of his *Martyrdom of St Peter*; where by the difference between the bodies and the leaves of his trees, and the disposition of their branches, one immediately discovers the difference between the trees themselves; where the different soils are so well expressed, and so exquisitely clothed with their proper plants, that a botanist has much ado to keep his hands from them. See Part II. Sect. ii.

Paolo Veronese is in architecture, what Titian is in landscape. To excel in landscape, we must, above all things, study nature. To excel in architecture, we must chiefly regard the finest works of art; such as the fronts of ancient edifices, and the fabrics of those moderns who have best studied and best copied antiquity. Next to Brunelleschi and Alberti, who were the first revivers of architecture, came Bramante, Giulio Romano, Sansovino, Sanmicheli, and lastly Palladio, whose works the young painter should above all the rest diligently study and imprint deeply on his mind. Nor is Vignola to be forgot; for some think he was a more scrupulous copier of antiquity, and more exact, than Palladio himself, inasmuch that most people consider him as the first architect among the moderns. For our part, to speak of him, not as lame, but as truth seems to require, we cannot help thinking, that rather than break through the generality of the rules contrived by him to facilitate practice, he has in some instances deviated from the most beautiful proportions of the antique, and is rather barren in the distribution and disposition of certain members. Moreover, the extraordinary height of his pedestals and cornices hinders the column from showing in the orders designed and employed by him, as it does in those of Palladio. Amongst that great variety of proportions to be met with in ancient ruins, Palladio has been extremely happy in choosing the best. His profiles are well contrived, yet easy. All the parts of his buildings hang well together. Grandeur, elegance, and beauty, walk hand in hand in them. In short, the very blemishes of Palladio, who was no slave to conveniency, and sometimes perhaps was too profuse in his decorations, are picturesque. And we may reasonably believe, that it was by following so great a master, whose works he had continually before his eyes, that Paolo Veronese formed that fine and masterly style which enabled him to embellish his compositions with such beautiful structures.

SECT. IX. *Of the Costume.*

12. THE study of architecture cannot fail, in another respect, of being very useful to the young painter, inasmuch as it will bring him acquainted with the form of the temples, theatres, basilics, theatres, and other buildings of the Greeks and Romans. Besides, from the basso-relievos with which it was customary to adorn these buildings, he may gather, with equal delight and profit, the nature of their sacrifices, arms, military ensigns, and dresses. The study of landscape, too, will render familiar to him the form of the various plants peculiar to each soil and climate, and such other things as serve to characterise the different regions of the earth. Thus by degrees he will learn what we call *costume*, one of the chief requisites in a painter; since, by means of it, he may express with great precision the time and place in which his scenes are laid.

The Roman school has been exceedingly chaste in this branch. So was the French, as long as it continued under the influence and direction of Poussin, whom we may justly style the *Learned Painter*; whereas the Venetian school has been to the last degree careless, not to say licentious. Titian made no difficulty of introducing in an *Ecce Homo* of his, pages in a Spanish garb, and the Austrian Eagle on the shields of the Roman soldiers. It is true indeed, that once he placed in the back ground of a *Crowning-with-Thorns*, a bust carrying the name of the emperor Tiberius, under whom our Saviour suffered: but it is likewise true, that, as if he thought it unbecoming a painter to pay any regard to such minutæ of learning and the costume, he shewed himself perfectly indifferent about them in all his other works. Tintoret, in a *Fall of Manna*, has armed his figures with muskets. And Paolo Veronese, in a *Last-Supper*, presents us with Swifs, Levantine, and other strange figures. In short, he has been so careless in this way, that his pieces have been often considered as so many beautiful masquerades.

It is impossible to express how much a picture suffers by such looseness and fancy, and sinks as a baftard of the art in the esteem of good judges. Some people, indeed, are of opinion that so scrupulous an observance of the costume is apt to hurt pictures, by depriving them of a certain air of truth arising, they think, from those features and habits to which we are accustomed; and which are therefore apt to make a greater impression, than can be expected from things drawn from the remote sources of antiquity: adding withal, that a certain degree of licence has ever been allowed those artists who in their works must make fancy their chief guide. See, say they, the Greeks; that is, the masters of Raphael and Poussin themselves. Do they ever trouble their heads about such niceties? The Rhodian statuarys, for example, have not scrupled to represent Laocoon naked; that is, the Priest of Apollo naked in the very act of sacrificing to the gods, and that too in presence of a whole people, of the virgins and matrons of Ilium. Now, continue they, if it was allowable in the ancient statuarys to neglect probability and decency to such a degree, to have a better opportunity of displaying their skill in the anatomy of the human body; why may it not be allowable in modern painters, the better to attain the end of their art, which is deception, to depart now and then a little

from the ancient manners and the too rigorous laws of the costume? But these reasons, we beg leave to observe, are more absurd than they are ingenious. What! are we to draw conclusions from an example, which, far from deciding the dispute, gives occasion to another? The learned are of opinion, that those Rhodian masters would have done much better, had they looked out for a subject in which, without offending so much against truth, and even probability, they might have had an equal opportunity of displaying their knowledge of the naked. And certainly no authority or example whatever, should tempt us to do any thing contrary to what both decency and the reason of things require, unless we intend, like Carponi, to represent

Sogni d'inferni, e sole di romanzi.

"The dreams of sick men, and the tales of fools."

No: a painter, the better to attain the end of his art, which is deception, ought carefully to avoid mixing the antique with the modern, the domestic with the foreign; things, in short, repugnant to each other, and therefore incapable of gaining credit. A spectator will never be brought to consider himself as actually present at the scene, the representation of which he has before him, unless the circumstances which enter it perfectly agree among themselves, and the field of action, if we may use the expression, in no shape belies the action itself. For instance, the circumstances, or, if you please, the accessories, in a *Finding of Moses*, are not, surely, to represent the borders of a canal planted with rows of poppies, and covered with country-houses in the European taste; but the banks of a great river shaded with clusters of palm-trees, with a Sphinx or an Anubis in the adjacent fields, and here and there in the back-ground a towering pyramid. And indeed the painter, before he takes either canvas or paper in hand, should on the wings of fancy transport himself to Egypt, to Thebes, or to Rome; and summoning to his imagination the physiognomy, the dresses, the plants, the buildings, suitable to his subject, with the particular spot he has chosen to lay his scene, so manage his pencil, as, by the magic of it, to make the enraptured spectators fancy themselves there along with him.

SECT. X. *Of Invention.*

13. As the operations of a general should, ultimately tend to battle and conquest; so should all the thoughts of a painter to perfect invention. Now, the studies which we have been hitherto recommending, will prove so many wings by which he may raise himself, as it were, from the ground, and soar on high, when desirous of trying his strength this way, and producing something from his own fund. Invention is the finding out probable things, not only such as are adapted to the subject in hand, but such, besides, as by their sublimity and beauty are most capable of exciting suitable sentiments in the spectator, and of making him, when they happen to be well executed, fancy that it is the subject itself in its greatest perfection, and not a mere representation of it; that he has before him. We do not say true things, but probable things; because probability or verisimilitude is, in fact, the truth of those arts which have the fancy for their object. It is, indeed, the business and duty of both naturalists and historians, to draw objects as they find them, and

represent them with all those imperfections and blemishes, to which, as individuals, they are subject. But an ideal painter, and such alone is a true painter, resembles the poet: instead of copying, he imitates; that is, he works with his fancy, and represents objects endued with all that perfection which belongs to the species and may be conceived in the archetype.

"*'Tis nature all, but nature methodized;*"

says an eminent poet, speaking of poetry: And the same may be said of painting; but it is nature methodized, and made perfect. Inasmuch, that the circumstances of the action, exalted and sublimed to the highest degree of beauty and boldness they are susceptible of, may, though possible, have never happened exactly such as the painter fancies and thinks proper to represent them. Thus, the piety of Æneas, and the anger of Achilles, are things so perfect in their kind, as to be merely probable. And it is for this reason that poetry, which is only another word for invention, is more philosophical, more instructive, and more entertaining, than history.

Here it is proper to observe, what great advantages the ancient had over the modern painters. The history of the times they lived in, fraught with great and glorious events, was to them a rich mine of the most noble subjects, which, besides, often derived no small sublimity and pathos from the mythology upon which their religion was founded. So far were their gods from being immaterial, and placed at an infinite distance above their worshippers; so far was their religion from recommending humility, penance, and self-denial, that, on the contrary, it appeared calculated merely to flatter the senses, inflame the passions, and poison the fancy. By making the gods partake of our nature, and subjecting them to the same passions, it gave man hopes of being able to mix with those who, though greatly above him, resembled him, notwithstanding, in so many respects. Besides, those deities of theirs were in a manner visible, and to be met at every step. The sea was crowded with Tritons and Nereids, the rivers with Naiads, and the mountains with Dryads. The woods swarmed with Fauns and Nymphs, who, in these obscure retreats, sought an asylum for their stolen embraces. The most potent empires, the most noble families, the most celebrated heroes, all derived their pedigree from the greater divinities. Nay, gods interested themselves in all the concerns of mankind. Apollo, the god of long arrows, stood by the side of Hector in the fields of Troy, and inspired him with new strength and courage to batter down the walls and burn the ships of the Greeks. These, on the other hand, were led on to the fight and animated by Minerva, preceded by Terror, and followed by Death. Jove nods, his divine locks shake on his immortal head; Olympus trembles. With that countenance, which allays the tempest, and restores serenity to the heavens, he gathers kisses from the mouth of Venus, the delight of gods and of men. Among the ancients, every thing sported with the fancy; and in those works which depend entirely on the imagination, some of our greatest masters have thought they could not do better than borrow from the Pagans, if we may be allowed to say it, their pictures of Tartarus, in order to render their own drawings of hell more striking.

After all, there have not been wanting able inven-

tors in painting among the moderns. Michael Angelo, notwithstanding the depth and boldness of his own fancy, is not ashamed, in some of his compositions, to *Dantize*; as Phidias and Apelles may be said formerly to have *Homerized*. Raphael, too, tutored by the Greeks, has found means, like Virgil, to extract the quintessence of truth; has seasoned his works with grace and nobleness, and exalted nature, in a manner, above herself, by giving her an aspect more beautiful, more animating, and more sublime, than she is, in reality, accustomed to wear. In point of invention, Domenichino and Annibal Carracci come very near Raphael, especially in the pieces painted by them in Rome; nor does Poussin fall very short of him in some of his pictures, particularly in his *Esther before Ahasuerus*, and his *Death of Germanicus*, the richest jewel belonging to the Barberine family. Of all the painters who have acquired any extraordinary degree of reputation, no one studied less to set off his pieces by bold and beautiful circumstances, or was more a stranger to what is called *poetical perfection*, than Jacopo Bassano. Among the numberless instances we could produce of his carelessness this way, let it suffice to mention a *Preaching of St Paul* painted by him in a place, near that of his birth, called *Marostega*. Instead of representing the apostle full of a divine enthusiasm, as Raphael has done, and thundering against the superstitions of the heathen in an assembly of Athenians; instead of exhibiting one of his auditors struck to the quick, another persuaded, a third inflamed; he makes him hold forth, in a village of the Venetian state, to a parcel of poor peasants and their wives, who take not the least notice of him; the women especially, who seem to mind nothing but the country labours in which he had found them employed. After all, this is an admirable piece; and would be a perfect one, had the painter not disgraced it so much by the poverty of his ideas.

With regard to invention, painting and poetry resemble each other so much in many other respects, besides that of combining in every action all the beauty and elegance it will admit, that they well deserve the name of *sister arts*. They differ, however, in one point, and that too of no small importance. It is this. The poet, in the representation of his story, relates what has already happened, prepares that which is still to come, and so proceeds, step by step, through all the circumstances of the action; and, to operate the greater effect on his hearers, avails himself of the succession of time and place. The painter, on the contrary, deprived of such helps, must be content to depend upon one single moment. But what a moment! A moment, in which he may conjure up, at once, to the eyes of the spectator, a thousand objects; a moment, teeming with the most beautiful circumstances that can attend the action; a moment, equivalent to the successive labours of the poet. This the works of the greatest masters, which are every where to be seen, sufficiently evince; among others, the *St Paul at Lystra*, by Raphael, whom it is impossible not to praise as often as this picture is mentioned. In order to give the spectator a thorough insight into the subject of this piece, the painter has placed, in the front of it, the cripple already restored to his limbs by the Apostle, fired with gratitude towards his benefactor, and exciting his countrymen to yield him all kinds of honour.

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honour. Round the cripple are some figures lifting up the skirts of his coat, in order to look at the legs reduced to their proper shape, and acknowledging by gestures full of astonishment the reality of the miracle; an invention, says a certain author, a professed admirer of antiquity, which might have been proposed as an example in the happiest age of Greece.

77th ed.
diol. 7.

We have another shining instance of the power of painting to introduce a great variety of objects on the scene at the same time, and of the advantage it has in this respect over poetry, in a drawing by the celebrated la Fage, which, like many other pieces of his, has not as yet been engraved, though worthier, perhaps, of that honour than any other performance of the kind. This drawing represents the descent of Æneas into hell. The field is the dark caverns of Pluto's kingdom, through the middle of which creeps slowly the muddy and melancholy Acheron. Nearly in the centre of the piece appears Æneas with the golden bough in his hand, and with an air of astonishment at what he sees. The Sybil, who accompanies him, is answering the questions which he asks her. The personage there is the ferryman of the pitchy lake, by which even the gods themselves are afraid to swear. Those, who, crowding in to the banks of the river, numberless as the leaves shaken off the trees by autumnal blasts, express, with outstretched hands, an impatience to be ferried to the opposite shore, are the unhappy manes, who, for want of burial, are unqualified for that happiness. Charon, accordingly, is crying out to them, and with his lifted-up oar driving them from his boat, which has already taken in a number of those who had been honoured with the accustomed funeral rites. Behind Æneas and the Sybil we discover a confused groupe of wretched souls, lamenting bitterly their misfortune in being denied a passage; two of them wrapped up in their clothes; and, in a fit of despair, sunk upon a rock. Upon the first lines of the piece stands a third groupe of uninhumed shades, Leucæspes, Orontes, and, in the midst of them, the good old Palinurus, formerly master and pilot of the hero's own vessel, who with joined hands most earnestly desires to be taken along with him into the boat, that, after death, at least, he may find some repose, and his dead body no longer remain the sport of winds and waves. Thus, what we see scattered up and down in many verses by Virgil, is here, as it were, gathered into a focus, and concentrated by the ingenious pencil of the painter; so as to form a subject well worthy of being exposed, in more shapes than one, to the eyes of the public.

When a painter takes a subject in hand, be it historical, be it fabulous, he should carefully peruse the books which treat of it, imprint well on his mind all the circumstances that attend it, the persons concerned in it, and the passions with which they must have been severally animated; not omitting the particulars of time and place. His next business is to create it, as it were, anew, observing the rules already laid down for that purpose: From what is true, choosing that which is most striking; and clothing his subject with such accessory circumstances and actions, as may render it more conspicuous, pathetic, and noble, and best display the powers of the inventive faculty. But, in doing this, great discretion is requisite; for, let his ima-

gination grow ever so warm, his hand is never to execute any thing that is not fully approved by his judgment. Nothing low or vulgar should appear in a lofty and noble argument; a fault, of which some of the greatest masters, even Lampieri and Poussin, have been now and then guilty.

The action must be one, the place one, the time one. We need not say any thing of those painters, who, like the writers of the Chinese and Spanish theatre, cram a variety of actions together, and so give us, at once, the whole life of a man. Such blunders, it is presumed, are too gross to be feared at present. The politeness and learning of the age seem to demand considerations of a more refined nature; such as, that the episodes introduced in the drama of a picture, the better to fill and adorn it, should be not only beautiful in themselves, but indispensably requisite. The games celebrated at the tomb of Anchises in Sicily, have a greater variety in them, and more sources of delight, than those that had been before celebrated at the tomb of Patroclus under the walls of Troy. The arms forged by Vulcan for Æneas, if not better tempered, are at least better engraved than those which the same god had forged several ages before for Achilles. Nevertheless, in the eyes of judges, both the games and the arms of Homer are more pleasing than those of Virgil, because the former are more necessary in the Iliad, than the latter in the Æneid. Every part should agree with, and have a relation to, the whole. Unity should reign even in variety; for in this, beauty consists. This is a fundamental maxim in all the arts whose object it is to imitate the works of nature.

Pictures often borrow no small grace and beauty from the fictions of poetry. Albani has left us, in several of his works, sufficient proofs of the great share the belles letters had in refining his taste. But Raphael, above all others, may, in this branch too, be considered as a guide and master. To give but one instance out of many; what a beautiful thought was it to represent the river himself, in a *Passage of Jordan*, supporting his waters with his own hands, in order to open a way to the army of the Israelites! Nor has he displayed less judgment in reviving, in his designs engraved by Agostino of Venice, the little loves of Ætius, playing with the arms of Alexander, conquered by the beauty of Roxana.

Among the ancients, Apelles and Parrhasius were those who distinguished themselves most in allegorical subjects, in which the inventive faculty shows itself to the greatest advantage; the first by his picture of Calumny †, the second by that of the Genius of the Athenians*. The ancient painter called *Galaton*, gave likewise a fine proof of his genius in this branch, by the life representing a great number of poets greedily quenching their thirst in the waters gushing from the mouth of the sublime Homer. And to this allegory, according to Guignol, Pliny ‡ has an eye, when he calls that prince of poets, the *fountain of wits*. But it is, c. 10. after all, no way surprising that we should often meet such fine flights of fancy in the ancient artists. They were not guided in their works by a blind practice: they were men of polite education; conversant with the letters of the age in which they lived; and the companions, rather than the servants, of the great

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† See Lucian upon Calumny; and Carlo Dati, in the *Life of Apelles*, note 20.
‡ Nat. Hist. lib. xxxv.
xvii. cap. 5.

77th ed.
diol. 4.

Disposition. men who employed them. The finest allegorical painter among the moderns was Rubens; and he was, accordingly, much celebrated for it. The best critics, however, find fault with his uniting in Luxemburg gallery, the queen-mother, in council, with two cardinals and Mercury. Nor is there less impropriety in his making Tritons and Nereids, in another piece of the same gallery, swim to the queen's vessel through the galleys of the knights of St Stephen. Such freedoms are equally disgusting with the prophecies of Sannazaro's Proteus, concerning the mystery of the incarnation; or the Indian kings of Camoen, reasoning with the Portuguese on the adventures of Ulysses.

Polym.
dial. 18.

The best modern performances in picturesque allegory are, certainly, those of Poussin; who availed himself, with great discretion and judgment, of the vast treasures with which, by a close study of the ancients, he had enriched his memory. On the other hand, le Brun, his countryman, has been very unhappy this way. Ambitious to have every thing his own, instead of allegories, he has filled the gallery of Versailles with enigmas and riddles, of which none but himself was qualified to be the Oedipus. Allegory must be ingenious, it is true; but then it must be equally perspicuous; for which reason, a painter should avoid all vague and indeterminate allusions, and likewise those to history and heathen mythology which are too abstruse to be understood by the generally of spectators. The best way, perhaps, to symbolize moral and abstract things, is to represent particular events: as Caracci did, by advice of Monsignore Agucchi, in the Farnesian palace. For example, what can better express a hero's love towards his country, than the virtuous Decius consecrating himself boldly to the infernal gods, in order to secure victory to his countrymen over their enemies? What finer emblems can we desire, of emulation, and an insatiable thirst for glory, than Julius Cæsar weeping before the statue of Alexander in the temple of Hercules at Gades? of the inconstancy of fortune, than Marius sitting on the ruins of Carthage, and receiving, instead of the acclamations of an army joyfully saluting him imperator, orders from a licitor of Sextilius to quit Africa? of indiscretion, than Candaules, who, by shewing the naked beauties of his wife to his friend Giges, kindled a passion that soon made him repent his folly? Such representations as these require no comment; they carry their explanation along with them. Besides, supposing, and it is the worst we can suppose, that the painter's aim in them should happen not to be understood, his piece would still give delight. It is thus that the fables of Ariosto prove so entertaining, even to those who understand nothing of the moral couched under them; and likewise the *Æneis*, though all do not comprehend the allusions and double intent of the poet.

SECT. XI. Of Disposition.

14. So much for invention. *Disposition*, which may be considered as a branch of invention, consists in the proper stationing of what the inventive faculty has imagined, so as to express the subject in the most lively manner. The chief merit of disposition may be said to consist in that disorder, which, wearing the appearance of mere chance, is, in fact, the most studied

effect of art. A painter, therefore, is equally to avoid the dryness of those ancients who always planted their figures like so many couples in a procession, and the affectation of those moderns who jumble them together as if they were met merely to fight and squabble. In this branch Raphael was happy enough to choose the just medium, and attain perfection. The disposition of his figures is always exactly such as the subject requires. In the *Battle of Constantine*, they are confusedly clustered with as much art, as they are regularly marshalled in *Christ's commitment of the keys to St Peter* and constituting him prince of the apostles.

Let the inferior figures of a piece be placed as they will, the principal figure should strike the eye most, and stand out, as it were, from among the rest. This may be effected various ways, as by placing it on the foremost lines, or in some other conspicuous part of the piece; by exhibiting it, in a manner, by itself; by making the principal light fall upon it; by giving it the most resplendent drapery; or, indeed, by several of these methods, nay, by all of them together. For, being the hero of the picturesque fable, it is but just that it should draw the eye to itself, and lord it, as it were, over all the other objects.

According to Leon Batista Alberti, painters should follow the example of comic writers, who compose their fable of as few persons as possible. For, in fact, a crowded picture is apt to give as much pain to the spectator, as a crowded road to the traveller.

Some subjects, it must be granted, require a number, nay, a nation, as it were, of figures. On these occasions, it depends entirely on the skill of the painter to dispose of them in such a manner, that the principal ones may always make the principal appearance; and contrive matters so, that the piece be not overcrowded, or want convenient rests and pauses. He must, in a word, take care that his piece be full, but not charged. In this respect, the *Battle of Alexander* by Le Brun are master-pieces which can never be sufficiently studied; whereas nothing, on the other hand, can be more unhappy than the famous *Paradise* of Tintoret, which covers one entire side of the great council-chamber at Venice. It appears no better than a confused heap of figures, a swarm, a cloud, a chaos, which pains and fatigues the eye. What a pity it is that he did not dispose this subject after a model of his own, now in the gallery of Bevilacqua at Verona! In this last, the several choirs of martyrs, virgins, bishops, and other saints, are judiciously thrown into so many clusters, parted here and there by a fine fleecy of clouds; so as to exhibit the innumerable host of heaven drawn up in a way that makes a most agreeable and glorious appearance. There goes a story, to our purpose, of a celebrated master, who in a drawing of the Universal Deluge, the better to express the immensity of the waters that covered the earth, left a corner of his paper without figures. Being asked, if he did not intend to fill it up: No, said he; do not you see that my leaving it empty is what precisely constitutes the picture?

The reason for breaking a composition into several groups is, that the eye, passing freely from one object to another, may the better comprehend the whole. But the painter is not to stop here; for these groups are,

See Bellori's
Life of Caracci.

are,

Disposition are, besides, to be so artfully put together, as to form rich clusters, give the whole composition a singular air of grandeur, and afford the spectator an opportunity of discerning the piece at a distance, and taking the whole in, as it were, at a single glance. These effects are greatly promoted by a due regard to the nature of colours, so as not to place together those which are apt to pain by their opposition, or distract by their variety. They should be so judiciously disposed as to temper and qualify each other.

A proper use of the *chiaroscuro* is likewise of great service on this occasion. The groups are easily parted, and the whole picture acquires a grand effect, by introducing some strong falls of shade, and, above all, one principal beam of light. This method has been followed with great success by Rembrandt in a famous picture of his, representing the Virgin at the foot of the cross on mount Calvary; the principal light darting upon her through a break of the clouds, while the rest of the figures about her stand more or less in the shade. Tintoret, too, acquired great reputation, as well by that brilliancy with which he enlivened his figures, as by his masterly manner of shading them; and Polidoro de Caravaggio, though he scarce painted any thing but basso-relievos, was particularly famous for introducing with great skill the effects of the *chiaroscuro*, a thing first attempted by Mantegna in his *Triumph of Julius Caesar*. It is by this means that his compositions appear so strikingly divided into different groups, and, among their other perfections, afford so much delight thro' the beautiful disposition that reigns in them.

In like manner, a painter, by the help of perspective, especially that called *aerial*, the opposition of local colours, and other contrivances which he may expect to hit upon by studying nature, and those who have best studied her before him, will be able not only to part his groups, but make them appear at different distances, so as to leave sufficient passages between them.

But the greatest caution is to be used in the pursuit of the methods here laid down; especially in the management of the *chiaroscuro*, that the effects attributed to light and shade, and to their various concomitants, may not run counter to truth and experience. This a capital point. For this purpose, a painter would do well to make, in little figures, as Tintoret and Poussin used to do, a model of the subject that he intends to represent, and then illuminate it by lamp or candle light. By this means he may come to know with certainty, if the *chiaroscuro*, which he has formed in his mind, does not clash with the reason of things. By varying the height and direction of his light, he may easily discover such accidental effects as are most likely to recommend his performance, and so establish a proper system for the illuminating it. Nor will he afterwards find it a difficult matter to modify the quality of his shades, by softening or strengthening them, according to the situation of his scene, and the quality of the light falling upon it. If it should happen to be a candle or lamp light scene, he would then have nothing to do but consider his model well, and faithfully copy it.

In the next place, to turn a groupe elegantly, the best pattern is that of a bunch of grapes adopted by Titian. As, of the many grains that compose a bunch

of grapes, some are struck directly by the light, and those opposite to them are in the shade, while the intermediate ones partake of both light and shade in a greater or less degree; so, according to Titian, the figures of a groupe should be so disposed, that, by the union of the *chiaroscuro*, several things may appear as it were but one thing. And in fact it is only from his having pursued this method, that we can account for the very grand effect of his pieces this way, in which it is impossible to study him too much.

The mannerists, who do not follow nature in the track of the masters just mentioned, are apt to commit many faults. The reason of their figures casting their shades in this or that manner seldom appears in the picture, or at least does not appear sufficiently probable. They are, besides, wont to trespass all bounds in splashing their pieces with light, that is, in enlivening those parts which we usually term the dead of a picture. This method, no doubt, has sometimes a very fine effect; but it is, however, to be used with no small discretion, as otherwise the whole loses that union, that pause, that majestic silence, as Caracci used to call it, which affords so much pleasure. The eye is not less hurt by many lights scattered here and there over a picture, than the ear is by the confused noise of different persons speaking all together in an assembly.

Guido Reni, who has imparted to his paintings that gaiety and splendour in which he lived, seems enamoured with a bright and open light; whereas Michael Angelo da Caravaggio, who was of a fullen and savage disposition, appears fondest of a gloomy and clouded sky: so that neither of them were qualified to handle indifferently all subjects. The *chiaroscuro* may likewise prove of great service to a painter in giving his composition a grand effect; but, nevertheless, the light he chooses must be adapted to the situation of the scene where the action is laid: nor would he be less faulty, who in a grotto or cavern, where the light entered by a chink, should make his shades soft and tender, than him who should represent them strong and bold in an open sky-light.

But this is not, by many, the only fault which mannerists are apt to be guilty of in historical pieces, and particularly in the disposition of their figures. To say nothing of their favourite groupe of a woman lying on the ground with one child at her breast, and another playing about her, and the like, which they generally place on the first lines of their pieces; nor of those half-figures in the back ground peeping out from the hollows contrived for them: they make a common practice of mixing naked with clothed figures; old men with young; placing one figure with its face towards you, and another with its back; they contrail violent motions with languid attitudes, and seem to aim at opposition in every thing; whereas oppositions never please, but when they arise naturally from the subject, like antitheses in a discourse.

As to foreshortened figures, too much affectation in using or avoiding them is equally blameable. The attitudes had better be composed than otherwise. It very seldom happens that there is any occasion for making them so impetuous as to be in danger of losing their equilibrium; a thing too much practised by some painters.

Hogarth's
Anal. of
Beauty.

In regard to drapery, equal care should be taken to avoid that poverty, which makes some matters look as if, through mere penury, they grudging clothes to their figures; and that profusion which Albani imputed to Guido, saying, that he was rather a tailor than a painter. The ornaments of dress should be used with great sobriety; and it will not be amiss to remember what was once said to an ancient painter: "I pity you greatly; unable to make Helen handsome, you have taken care to make her fine."

Let the whole, in a word, and all the different parts of the disposition, possess probability, grace, costume, and the particular character of what is to be represented. Let nothing look like uniformity of manner; which does not appear less in the composition than it does in colouring, drapery, and design; and is, as it were, that kind of accent, by which painters may be as readily distinguished as foreigners are, by pronouncing in the same manner all the different languages they happen to be acquainted with.

SECT. XII. *Of the Expression of the Passions.*

15. That language which above all others a painter should carefully endeavour to learn, and from nature herself, is the language of the passions. Without it the finest works must appear lifeless and inanimate. It is not enough for a painter to be able to delineate the most exquisite forms, give them the most graceful attitudes, and compose them well together; it is not enough to dress them out with propriety, and in the most beautiful colours; it is not enough, in fine, by the powerful magic of light and shade to make the canvass vanish. No; he must likewise know how to clothe his figures with grief, with joy, with fear, with anger; he must, in some sort, write on their faces what they think and what they feel; he must give them life and speech. It is indeed in this branch that painting truly soars, and in a manner rises superior to itself; it is in this branch she makes the spectator apprehend much more than what she expresses,

The means employed in her imitations by painting, are the circumscription of terms, the chiaro-scuro, and colours; all which appear solely calculated to strike the visual faculty. Notwithstanding which, she contrives to represent hard and soft, rough and smooth surfaces, which are objects of the touch; and this by means of certain tints, and a certain chiaro-scuro, which has a different look in marble, in the bark of trees, in downy and delicate substances. Nay, she contrives to express sound and motion, by means of light and shade, and certain particular configurations. In some landscapes of Diderich, we almost hear the water murmur, and see it tremble along the sides of the river, and of the boats upon it. In the *Battle of Burgoyne* we really apt to fancy that the trumpet sounds; and we see the horse, who has thrown his rider, scamper along the plain. But what is still more wonderful, painting, in virtue of her various colours and certain particular gestures, expresses even the sentiments and most hidden affections of the soul, and renders her visible, so as to make the eye not only touch and hear, but even kindle into passion, and reason.

Many have written, and amongst the rest the famous le Brun, on the various changes, that, according to the various passions, happen in the muscles of the

face, which is, as it were, the dumb tongue of the soul. They observe, for example, that in fits of anger, the face reddens, the muscles of the lips puff out, the eyes sparkle; and that, on the contrary, in fits of melancholy, the eyes grow motionless and dead, the face pale, and the lips sink in. It may be of service to a painter to read these and such other remarks; but it will be of infinitely more service to study them in nature itself, from which they have been borrowed, and which exhibits them in that lively manner which neither tongue nor pen can express.

But if a painter is to have immediate recourse to nature in any thing, it is particularly in treating those very minute and almost imperceptible differences, by which, however, things very different from each other are often expressed. This is particularly the case with regard to the passions of laughing and crying; as in these, however contrary, the muscles of the face operate nearly in the same manner. As the famous Pietro de Cortona was one day finishing the face of a crying child in a representation of the Iron Age, with which he was adorning the floor, called the *Hot bath*. in the royal palace of Pitti, Ferdinand II. who happened to be looking over him for his amusement, could not forbear expressing his approbation, by crying out, "Oh how well that child cries!" To whom the artist—"Has your majesty a mind to see how easy it is to make children laugh? Behold, I'll prove it in an instant!" And taking up his pencil, by giving the contour of the mouth a concave turn downwards, instead of the convex upwards which it before had, and with little or no alteration in any other part of the face, he made the child, who a little before seemed ready to burst its heart with crying, appear in equal danger of bursting its sides with immoderate laughter; and then, by restoring the altered features to their former position, he soon set the child a-crying again. [*Lectures of Philip Baldinucci, in the academy of la Crusca. Lystrato, &c.*]

According to Leonardo da Vinci, the best masters that a painter can have recourse to in this branch, are those dumb men, who have found out the method of expressing their sentiments by the motion of their hands, eyes, eyebrows, and in short every other part of the body. This advice, no doubt, is very good; but then such gestures must be imitated with great sobriety and moderation; lest they should appear too strong and exaggerated, and the piece should show nothing but pantomimes, when speaking figures alone are to be exhibited; and so become theatrical and second-hand, or, at best, look like the copy of a theatrical and second-hand nature.

We are told strange things of the ancient painters of Greece in regard to expression: especially of Aristides; who, in a picture of his, representing a woman wounded to death at a siege, with a child crawling to her breast, makes her appear afraid, lest the child, when she was dead, should, for want of milk, suck her blood. *A Medea murdering her children*, by Timomachus, was likewise much cried up, as the ingenious artist contrived to express, at once, in her countenance, both the fury that hurried her on to the commission of so great a crime, and the tenderness of a mother that seemed to withhold her from it. Rubens attempted to express such a double effect in the face of *Mary of Me-*
dicis,

Expression
of the
Passions.

dicis, still in pain from her past labour, and at the same time full of joy at the birth of a Dauphin. And in the countenance of Sancta Polonia, painted by Tiepolo for St Anthony's church at Padua, one may clearly read a mixture of pain from the wound given her by the executioner, and of pleasure from the prospect of paradise opened to her by it.

Few, to say the truth, are the examples of strong expression afforded by the Venetian, Flemish, or Lombard schools. Deprived of that great happiness, the happiness of being able to contemplate, at leisure, the works of the ancients, the purest sources of perfection in point of design, expression, and character; and having nothing but nature constantly before their eyes; they made strength of colouring, blooming complexions, and the grand effects of the chiaroscuro, their principal study: they aimed more at charming the senses than at captivating the understanding. The Venetians, in particular, seem to have placed their whole glory in setting off their pieces with all that rich variety of personages and dress, which their capital is continually receiving by means of its extensive commerce, and which attracts so much the eyes of all those who visit it. It is much to be doubted, if, in all the pictures of Paolo Veronese, there is to be found a bold and judicious expression, or one of those attitudes which, as Petrarch expresses it, speak without words; unless, perhaps, it be that remarkable one in his *Marriage Feast of Cana of Galilee*. At one end of the table, and directly opposite to the bridegroom, whose eyes are fixed upon her, there appears a woman in red, holding up to him the skirt of her garment; as much as to say, we may suppose, that the wine miraculously

produced was exactly of the colour with the fluff on her back. And in fact it is red wine we see in the cups and pitchers. But all this while the faces and attitudes of most of the company betray not the least sign of wonder at so extraordinary a miracle. They all, in a manner, appear intent upon nothing but eating, drinking, and making merry. Such, in general, is the style of the Venetian school. The Florentine, over which Michael Angelo presided, above all things curious of design, was most minutely and scrupulously exact in point of anatomy. On this he set her heart, and took singular pleasure in displaying it. Not only elegance of form, and nobleness of invention, but likewise strength of expression, triumph in the Roman school, nursed as it were amongst the works of the Greeks, and in the bosom of a city which had once been the seminary of learning and politeness. Here it was that Domenichino and Poussin, both great masters of expression, refined themselves, as appears more particularly by the *St Jerome* of the one, and the *Death of Germanicus*, or the *Slaughter of the Innocents*, by the other. Here it was that arose Raphael, the sovereign master of them all. One would imagine, that pictures, which are generally considered as the books of the ignorant, and of the ignorant only, he had undertaken to make the instructors even of the learned. One would imagine, that he intended, in some measure, to justify Quintilian*, who affirms, that painting has more power over us than all the arts of rhetoric. There is not, indeed, a single picture of Raphael's, from the study of which those who are curious in point of expression may not reap great benefit; particularly his *Martyrdom of St*

Felicitas, his *Transfigurations*, his *Joseph explaining to Pharaoh his dream*, a piece so highly rated by Poussin. His *School of Athens*, in the Vatican, is, to all intents and purposes, a school of expression. Among the many miracles of art with which this piece abounds, we shall single out that of the four boys attending on a mathematician, who, stooping to the ground, his compasses in his hand, is giving them the demonstration of a theorem. One of the boys, recollecting within himself, keeps back, with all the appearance of profound attention to the reasoning of the master; another, by the briskness of his attitude, discovers a greater quickness of apprehension; while the third, who has already seized the conclusion, is endeavouring to beat it into the fourth, who, standing motionless, with open arms, a staring countenance, and an unpeppable air of stupidity in his looks, will never perhaps be able to make any thing of the matter. And it is probably from this very group that Albani, who studied Raphael so closely, drew the following precept of his: "That it behoves a painter to express more circumstances than one by every attitude; and so to employ his figures, that, by barely seeing what they are actually about, one may be able to guess, both what they have been already doing, and are next going to do." This is indeed a difficult precept; but it is only by a due observance of it that the eye and the mind can be made to hang in suspense on a painted piece of canvas. It is expression that a painter, ambitious to soar in his profession, must, above all things, labour to perfect himself in. It is the last goal of his art, as Xenoph.

Socrates proves to Parrhasius. It is in expression that dumb poetry consists, and what the prince of our poets calls a visible language. Memorab.
l. iii.

SECT. XI. Of proper Books for a Painter.

FROM what has been already said, it may be easily gathered, that a painter should be neither illiterate, nor unprovided with books. Many are apt to imagine, that the *Iconologia* of Ripa, or some such collection, is alone sufficient for this purpose; and that all the apparatus he stands in need of, may be reduced to a few casts of the remains of antiquity, or rather to what remnants used to call his *antiques*, being nothing more than coats of mail, turbans, sherds of stuff, and all manner of old household trumpery and wearing apparel. Such things, no doubt, are necessary to a painter, and, perhaps, enough for one who wants only to paint half-lengths, or is willing to confine himself to a few low subjects. But they are by no means sufficient for him who would soar higher; for a painter who would attempt the Universe, and represent it in all its *Algoriti* on parts, such as it would appear, had not matter proved refractory to the intentions of the sovereign Artist. Such a painter alone is a true, an universal, a perfect painter.—No mortal, indeed, must ever expect to rise to that sublimity; yet all should aspire to it, on pain of ever continuing at a very mortifying distance from it: as the orator, who wishes to make a figure in his profession, should propose to himself no less a pattern than that perfect orator described by Tully; nor the courtier, than that perfect courtier delineated by Castiglione. It cannot, therefore, appear surprising if we insist on the propriety of reckoning a good col-

* Instit.
lib. xi.
cap. 3.

selection of books as part of such a painter's implements. The Bible, the Greek and Roman historians, the works of Homer, that prince of painters, and of Virgil, are the most classical. To these let him add the *Metamorphoses* of Ovid, some of our best poets, the voyage of Paulanias, Vinci, Vafari, and others upon painting.

It will also be of considerable advantage to him to have a well-chosen collection of drawings by the best masters, in order to trace the progress and history of his art, and make himself acquainted with the various styles of painting, which have been, and now are, in the greatest vogue. The prince of the Roman school was not ashamed to hang up in his study the drawings of Albert Durer; and spared no pains or expence to acquire all the drawings he could meet with, that were taken from basso relievo; things, which the art of engraving has since rendered so common as to be in every one's hands. This art of multiplying drawings by means of the graver is of the same date, and boasts the same advantages, with the art of printing, by means of which the works of the mind are multiplied, as it were, at one stroke, and dispersed over the whole world.

The sight of fine subjects treated by able masters, and the different forms which the same subjects assume in different hands, cannot fail both of enlightening and enlaming the mind of the young painter. The same may be said of the perusal of good poets and historians, with the particulars and proofs of what they advance; not to mention those ideas and flights of invention, with which the former are wont to clothe, beautify, and exalt every thing they take in hand. Bouchardon, after reading Homer, conceived, to use his own words, that men were three times taller than before, and that the world was enlarged in every respect. It is very probable, that the beautiful thought of covering Agamemnon's face with the skirt of his mantle, at the sacrifice of Iphigenia, was suggested to Timantes by the tragedy of Euripides. And the sublime conceit of Raphael, who, in a *Creation* of his, represents God in the immense space, with one hand reaching to the sun and the other to the moon, may be considered as the child of the following words of the Psalmist: *The heavens declare the glory of God, and the firmament sheweth his handy-work.*

This thought of Raphael has been, indeed, censured by Mr Webb. "A God," says this gentleman, "extending one hand to the sun, and another to the moon, destroys that idea of immensity, which should accompany the work of creation, by reducing it to a world of a few inches." But the opinion of Count Algarotti is very different. "For my part," says that elegant critic, "I cannot discover, in this painting, a world of a few inches, but a world on a much greater scale; a world of millions and millions of miles: and yet this so immense a world, by means of that act of the Godhead, in which with one hand he reaches to the sun, and with the other to the moon, shrinks, in my imagination, to a mere nothing, in respect to the immensity of God himself; which is all that the powers of painting can pretend to. This invention is, though in a contrary sense, of the same kind with that of Timantes, who, to express the enormous size of a sleeping Polyphemus, placed round him some satires measuring the monster's thumb

with a thyrus. Hence Pliny, who relates the fact, takes occasion to tell us, that his works always imply more than they express; and that how great soever he may be in execution, he is still greater in invention: *Atque in omnibus ejus operibus intelligitur plus semper quam pingitur; et cum ars summa sit, ingenium tamen ultra artem est.*" Nat. Hist. lib. xxxv. c. x.

The perusal of good authors cannot but be very serviceable to a painter in another respect; as, among the great number of subjects afforded by history and poetry, he may expect to meet with many on which his talents may display themselves to the greatest advantage. A painter can never be too nice in the choice of his arguments; for on the beauty of them, that of his piece will greatly depend. How much to be pitied, therefore, were our first masters, in being so often obliged to receive their subjects from the hands of simple and illiterate persons! and what is worse, to spend all the riches of their art upon barren or unworthy subjects! Such are the representations of those saints, who, though they never had the least intercourse with each other, and perhaps even lived in different ages, are, notwithstanding, to be introduced, *tete a tete*, as it were, in the same picture. The mechanic of the art, may, indeed, display itself on these occasions; but by no means the ideal. The disposition may be good and praise-worthy, as in the works of Cortona and Lafrance; but we are not to expect in them either invention or expression, which require for their basis the representation of some fact capable of producing such effects. Who does not, on the bare mention of this abuse, immediately recollect many sad instances of it? such as the famous St Cæcilia of Raphael, surrounded by St Paul, St Mary Magdalen, St John, and St Augustin; and the picture of Paolo Veronese, in the vestry of the Nuns of St Zachary at Venice, in which St Frances of Assisium, Saint Catharine, and St Jerome richly habited in his cardinal's robes, form a ring round the Virgin seated on a throne with the child Jesus in her arms; perhaps the most beautiful and picturesque of all the insipid and insignificant pieces with which Italy abounds. It is very shocking to think, that young painters should be obliged to study their art from such wretched compositions.

The subjects in which the pencil triumphs most, and with which a judicious painter may stock himself by the perusal of good books, are, no doubt, those which are most universally known, which afford the largest field for a display of the passions, and contain the greatest variety of incidents, all concurring, in the same point of time, to form one principal action. Of this the story of Coriolanus besieging Rome, as related by Livy, is a shining example. Nothing can be imagined more beautiful than the scene of action itself, which ought to take in the pretorium in the camp of the Volscians, the Tiber behind it, and the seven hills, among which the towering Capitol is, as it were, to lord it over the rest. It is impossible to conceive a greater variety, than what must appear in that crowd of soldiers, women, and children, all which are to enter the composition; unless, perhaps, it be that of the different passions with which they are severally agitated; some wishing that Coriolanus may raise the siege, others fearing it, others again suspecting it. But the

Painter's
Balance.Painter's
Bal. nce.Liv. Dec. I.
Lib. 2.

the principal groupe forms the picturesque part of the piece. Coriolanus, hastily descending from his tribunal, and hurried on by love, to embrace his mother, stops short through shame, on her crying out to him, Hold! let me first know, if it is a son, or an enemy, I am going to embrace? Thus a painter may impart novelty to the most hackneyed subject by taking, for his guides those authors who possess the happy talent of adding grace and dignity, by their beautiful and sublime descriptions, even to the most common and trifling transactions.

SECT. XV. *Of the Painter's Balance.*

18. THE celebrated de Piles, who by his writings, has thrown so much light upon painting, in order to assist young painters in forming a right judgment of those masters who hold the first rank in the profession, and to reduce such judgment to the greater precision, bethought himself of a pictorial balance, by means of which a painter's merit may be weighed with the greatest exactness. This merit he divides into Composition, Design, Colouring, and Expression; and in each of these branches he has assigned every painter that share he thought him entitled to, according as he approached more or less the highest degree of excellence and summit of perfection; so that, by summing up the numbers which, standing against each master's name, express his share of merit in each of these branches, we have his total merit or value in the art, and may hence gather what rank one painter holds in regard to another. Several objections, it is true, have been flattered to this method of calculation, by a famous mathematician of our days, who, among other things, insists, that it is the product of the above numbers multiplied by each other, and not the sum of them, that gives the merit of the artist. But this is not a place to enter into such niceties, nor indeed would the doing it be of any service to the art. The only thing worth our notice is, whether the original numbers, standing for the painter's merit in the several branches of his art, are such as he is really intitled to, without suffering ourselves to be biased by any partiality, as de Piles has been, in favour of the prince of the Flemish school; the consequence of which, strange as it may appear, is, that in his balance Raphael and Rubens turn out exactly of the same weight.

Raphael is now universally allowed to have attained that degree of perfection, beyond which it is scarce lawful for mortals to aspire. Painting, in some measure, revived among us by the diligence of Cimabue, towards the decline of the 13th century, received no small improvements from the genius of Giotto, Masaccio, and others; inasmuch that, in less than 200 years, it began to blaze forth with great lustre in the works of Ghirlandai, Gian Bellino, Mantegna, Pietro Perugino, and Leonardo da Vinci, the best grounded of them all, a man of great learning, and the first who contrived to give relief to pictures. But whatever improvement the art might have received from these different masters in different parts of Italy, they still, to a man almost, servilely followed the same manner, and all partook more or less of that hardness and dryness, which, in an age still Gothic, painting received from the hands of its restorer Cimabue; till Raphael, at length, issuing from the Peruginian school, and, study-

ing the works of the Greeks, without ever losing sight of nature, brought the art, in a manner, to the highest pitch of perfection. This great man has, if not entirely, at least in a great measure, attained those ends which a painter should always propose to himself, to deceive the eye, satisfy the understanding, and touch the heart. So excellent are his pieces, that the spectator, far from praising his pencil, seems sometimes entirely to forget that they are the feats of it which he has before him; solely intent upon, and as it were transported to, the scene of action, in which he almost fancies himself a party. Well, indeed, has he deserved the title of *divine*, by the beauty and comprehensiveness of his expression, the justness and nobleness of his compositions, the chastity of his designs, and the elegance of his forms, which always carry a natural ingenuity along with them; but above all, by that inexpressible gracefulness, more beautiful than beauty itself, with which he has contrived to season all his pieces. Carlo Maratti having engraved a piece, called the *School*, placed at the top of it the three Graces, with this verse under them,

Seneza di noi ogni fatica è vana;

"Without our aid, all labour is in vain."

Without their aid, in fact, the light of a picture is no better than darkness, every attitude is insipid, every motion awkward. It is they who impart to every thing that *Je ne sçai quoi*, that charm, which is as sure to conquer, as impossible to be defined. Maratti has placed the Graces on high, and, as it were, descending from heaven, in order to shew that they really are a celestial gift. Happy the artist on whose cradle they have smiled, whose vows and offerings they have not disdain'd! Maratti was not to be informed, that gracefulness, that jewel which adds such value to every thing, tho' not originally obtainable by all the gold of diligence and study, may yet be greatly heightened and polished by them.

Though Raphael might boast, like Apelles* of old, * *ῥαφαήλ*, whom he resembled in so many other respects, that in *Instit. l. xii.* gracefulness he had no equal; yet Parmigiano and Correggio must be allowed to have come very near him. One of them has, however, often trespassed the just bounds of symmetry; and the other is not always chaste in his designs: both, besides, were too apt to be guilty of affectation. We ought perhaps to forgive Correggio every thing, for the sake of that uncommon greatness of manner, that life and soul, which he has infused into all his figures; for the sake of that inimitable ease and delicacy of pencil, which makes his pieces appear as if finished in a day, and seen in a glass. Of this we have a sufficient proof in the Ancona of St Jerome and the Magdalen on their knees before the child Jesus, which is in Parma; the finest picture, perhaps, that ever issued from mortal hands.

There are some glimpses of Correggio's style in the works of Barocci, though he studied at Rome. He never drew a figure that he did not borrow from nature; and, for fear of losing the masses, used to drape his models with very large folds. His pencil was exceedingly sweet, and his colouring equally harmonious. He indeed spoiled a little the natural tints by too free an use of reds and blues; and has now and then robbed things of their body, by shading them too much, and melting them, as it were, into one another.

See Mel-
ran's re-
marks, in
Mem. de
l'Acad. des
Sciences,
1753.

Algarotti.

Algarotti.

ther. In point of design, he was far more diligent than successful; and, in the air of his heads, affected the gracefulness of the Lombard school, rather than the elegance of the Greeks and his countryman Raphael.

Julio Romano, full of spirit, and of learning and uncommon conceits, seems to come nearer the manner of Michael Angelo than the elegantly natural one of Raphael, under whom he studied.

The Germans, by fervently following Michael Angelo, gave into those strange attitudes and clumsy forms which appear in the works of their greatest men, Spranger and Goltzio.

The Florentines copied him with greater judgment and discretion. We must, however, except Andrea del Sarto, who, though an observer of truth, is somewhat clumsy in his figures. But then he is easy in his draperies; sweet in his colours; and would have carried the palm among the Tuscans, had it not been ravished from him by Fra. Bartolomeo; to immortalise whom, his *St Mark* in the palace of Pitti would alone be sufficient; for there is not wanting in that piece any of the perfections necessary to constitute an excellent master.

Titian, whom Giorgione first imitated in the art, is an universal master. Upon every thing he took in hand, he has contrived to stamp its own proper nature. His pencil flows with juices that are truly vital. His figures breathe; and the blood circulates in their faces. And though some perhaps have surpassed him in design; not but that he is generally correct enough in the bodies of his women; and his children, on account of their form, have been studied by the greatest masters; he never had his equal in colouring, or in portrait and landscape painting. He most indefatigably studied truth, and never lost sight of her. He most indefatigably laboured to convert, if we may be allowed the expression, the colours of his pallet into flesh and blood. But what cost him most was, as he himself confesses, to cover and hide his fatigue; and in this he has succeeded so well, that his works seem rather born than made. His fortune equalled his merit. He was greatly honoured by Charles V. as the great Raphael had been, a few years before, by the Popes Julius II. and Leo X.

Jacopo Bassano distinguished himself, at the same time, by the strength of his colouring. Few have equalled him in the just dispensation of light reflected from one object to another, and in those happy contrasts by means of which painted objects become really transparent. He may boast his having deceived an Aunibal Caracci, as Pharrasio formerly deceived Zeuxes; and had the glory of Paolo Veronese's not being willing that his son Carletto should learn the principles of colouring from any other master.

Paolo Veronese was the creator, as it were, of a new manner. Though careless in point of design, and in point of costume extremely licentious, he was noble of fancy, and most fruitful of invention. One would imagine, that those who behold his magnificent pictures longed to be of the action represented by them; and it may be said of him with great justice, that even his faults are pleasing. He has had very great admirers in every age; and among them a Guido Reni, whose praise, no doubt, would have flattered him most.

Tintoret is no way inferior to any of the Venetians in those pieces which he drew by way of displaying his talents, and not improving them. This he has particularly shown in his *Martyrdom*, now in the school of St Mark; in which there is design, colouring, composition, effects of light, life, expression, and all carried to the highest pitch of perfection. Scarce had this picture made its appearance, when all mankind seemed to fall in love with it. Arctine himself, tho' so warm a friend to Titian, that, through mere jealousy he turned Tintoret out of his school, could not forbear crying it up to excess. He wrote himself to Titoret, that this piece had extorted the applause of all those who saw it. The scene, adds he, appears rather true than feigned; and happy would you be, if, instead of being so expeditious, you could prevail on yourself to be a little more patient.

Next to these great artists, who had no guide but nature, or the most perfect copies of nature, the Greek statues, started up those other artists, whom we are not to consider as the disciples of nature, so much as of those masters who a little before had revived the art of painting, and restored it to its ancient honour and dignity. Such were the Caraccis, who undertook to unite in their manner the beauties of all the most famous Italian schools, and founded a new one, which did not yield to the Roman in elegance of forms, to the Florentine in correctness of design, nor to the Venetian or Lombard in beauty of colouring. These schools, if we may be allowed the expression, are the primitive metals of painting; and the Caraccis, by melting them down together, composed a Corinthian metal, noble indeed and beautiful to look at, but wanting the strength, ductility, and weight, possessed singly by the different metals which compose it. And indeed the greatest praise that can be bestowed on the works of the Caraccis, is not owing to any air of originality in them, or any perfect imitation of nature, but to the striking likeness in them to the manner of Titian, Raphael, Parmigianino and Correggio. As to the rest, the Caraccis did not neglect to provide their school with all those helps which learning could afford; from a conviction that the arts never succeed through mere good fortune or boldness of fancy, but are rather so many habits working according to the dictates of learning and right reason. In their school, the pupils were taught perspective, anatomy, in a word every thing necessary to lead them by the shortest and safest road. And it is to this that we are chiefly to attribute the school of Bologna's having produced a greater number of able masters than any other.

At the head of these masters stand Domenichino and Guido; one a most curious observer of nature, and most profound painter; the other the inventor of a certain noble and beautiful manner peculiar to himself, which shines especially in that sweetness and beauty he has contrived to give the faces of his women. Both these artists have been preferred to the Caraccis; and it must be owned, that the last did really excel them.

Francesco Barbieri, called *il Guercino*, studied first in this school; but he afterwards formed to himself a certain peculiar manner, entirely founded upon nature and truth. Quite careless in the choice of his forms; he produced a chiaroscuro that gives the greatest relief to objects, and renders them palpable. Caravaggio, the

*Raccolta di
Lettere sulla
Pittura,
Scultura, e
Architettura,
Tom. III.
let. 65.*

*† Bellori's
Lives of
Poussin and
Fr. Flamini-
go.*

Painter's
Balance.

the Rembrants of Italy, was the real author of this manner; which, in these our days, has been again brought to light by Piazetta and Crespi. He abused the saying of that Greek, who being asked, who was his master, pointed to the populace; and such, indeed, was the magic of his *chiaroscuro*, that, as often as he undertook to copy nature in low and trivial subjects, he had the power of deceiving even a Domenichino and a Guido. The style of Caravaggio was followed by two famous Spaniards; Velezquez, the founder of a school among his countrymen; and il Ribera, who settled in Italy, and from whom afterwards the whimsical Salvator Rosa, and that most fertile genius Lucas Giordano, the Proteus and thunderbolt of painting, studied the first principles of the art.

Between the masters of the Bolognian and those of the other schools of Italy, we are to place Rubens, the prince of the Flemish school, and a man of the most elevated genius, who appeared, at once, as painter and ambassador in a country, which, in a few years after, saw one of its greatest poets secretary of state. Nature endowed him with great vivacity, and great ease is working; and he added learning to these natural gifts. He, too, studied our masters, Titian, Tintoret, Caravaggio and Paul; and borrowed a little from every one of them, so sparingly, however, that his own peculiar manner predominates. He was in his movements more moderate than Tintoret, more soft in his *chiaroscuro* than Caravaggio; but not so rich in his compositions, or light in his touches, as Paolo; and, in his carnations, always less true than Titian, and less delicate than his own scholar Vandyke. He contrived to give his colours the greatest transparency, and no less harmony, notwithstanding the extraordinary deepness of them; and he had a strength and grandeur of style entirely his own. He would have soared still higher, had nature afforded him finer objects in Flanders, or had he known how to create them anew, or correct them after the patterns left us by the Greek masters.

Poussin, the prince of French painters, had a particular fondness for the works of Rubens, at the same time that he sought for the art of design among the ancient marbles, in which, as an ingenious author expresses it, he fits as Queen to give law to the moderns. He spared no pains in the choice and composition of his subjects; and gave them life, learning, and dignity. He would have equalled Raphael himself, whose style he imitated; were gracefulness, ease, and vivacity, to be acquired by study. For, in fact, it was by mere dint of labour and fatigue, that he produced what in a manner cost Raphael nothing; inasmuch, that his figures may be said to mimic the natural actions of that great master.

PART II. Of the Different CLASSES of PAINTING.

SECT. I. General Enumeration.

21. **A**ll the objects in nature are susceptible of imitation by the pencil, the masters of this art have applied themselves to different subjects, each one as his talents, his taste, or inclination, may have led him. From whence have arisen the following classes.

SECT. XVI. Of Imitation.

19. A painter ought attentively to consider, compare together, and weigh in the balance of reason and truth, all these different styles. But he ought likewise carefully to guard against too great a fondness for any one of them in particular that he may think proper to adopt; otherwise, to use the Danteque expression of a first-rate master †, instead of the child, he would be-
come the grand-child, of nature.

† Da Vinci
on Painting.

Besides, his imitation must be of generals and not of particulars. Whatever a young painter's natural disposition may be, whether to paint boldly and freely like Tintoret and Rubens, or to labour his works like Titian or da Vinci, let him follow it. This kind of imitation is very commendable. It is thus that Dante, at the same time that he carefully avoided adopting the particular expressions of Virgil, endeavoured to seize his bold and free manner, and at last caught from him that elegance of style which has done him so much honour.

20. As to the rest, nothing should hinder an able master from making use now and then of any antique, or even modern figure, which he may find his account in employing. Sanzio, in a *St Paul at Lystra*, scrupled not to avail himself of an ancient sacrifice in basso-relievo; nor did Buonarroti himself disdain to use, in his paintings of the Sistine chapel, a figure taken from that famous cornelian which tradition tells us he wore on his fingers, and which is now in the possession of the most Christian King. Men like these avail themselves of the productions of others in such a manner as to make us apply to them, what La Bruyere said of Despreaux, that one would imagine the thoughts of other men had been of his own creation.

In general, a painter should have his eye constantly fixed on nature, that inexhaustible and varied source of every kind of beauty; and should study to imitate her in her most singular effects. As beauty scattered over the whole universe, shines brighter in some objects than in others, he should never be without his little book and crayon, in order to make drawings of every beautiful or uncommon object that may happen to present itself; and take sketches of every fine building, every situation, every effect of light, every flight of clouds, every flow of drapery, every attitude, every expression of the passions, that may happen to strike him. He may afterwards employ these things as occasions offer; and in the mean time will have the advantage of acquiring a grand taste. By uniting in a grand composition effects no less bold and beautiful than true and natural, he will acquire the same glory that orators acquire by the sublime, the glory of surprising, and in a manner exalting us above ourselves.

II. *Rural history*; or the representation of a country life, of villages and hamlets, and their inhabitants. This is an inferior class; and in which Teniers, Brueghel, Watteau, &c. have great reputation, by rendering it at once pleasing and graceful.

III. *Portrait-painting*; which is an admirable branch of this art, and has engaged the attention of the greatest masters in all ages, as Apelles, Guido, Van Dyke, Rembrandt, Regauds, Pefne, Kneller, La Tour, &c.

IV. *Grotesque histories*: as the nocturnal meetings of witches; sorceries, and incantations; the operations of mountebanks, &c. A sort of painting in which the younger Brueghel, Teniers, and others, have exercised their talents with success.

V. *Battle-pieces*; by which Huchtemberg, Wouwerman, &c. have rendered themselves famous.

VI. *Landscapes*; a charming species of painting, that has been treated by masters of the greatest genius in every nation.

VII. *Landscapes diversified with waters*, as rivers, lakes, cataracts, &c.; which require a peculiar talent, to express the water sometimes smooth and transparent, and at others foaming and rushing furiously along.

VIII. *Sea-pieces*; in which are represented the ocean, harbours, and great rivers; and the vessels, boats, barges, &c. with which they are covered; sometimes in a calm, sometimes with a fresh breeze, and at others in a storm. In this class Backhuysen, Vanderveelde, Blome, and many others, have acquired great reputation.

IX. *Night-pieces*; which represent all sorts of objects, either as illuminated by torches, by the flames of a conflagration, or by the light of the moon. Schalck, Vanderveerde, Vanderpool, &c. have here excelled.

X. *Living Animals*: A more difficult branch of painting than is commonly imagined; and in which Rosa, Carré, Vanderveelde, and many others, have succeeded marvellously well.

XI. *Birds of all kinds*; a very laborious species, and which requires extreme patience minutely to express the infinite variety and delicacy of their plumage.

XII. *Culinary pieces*; which represent all sorts of provisions, and animals without life, &c. A species much inferior to the rest, in which nature never appears to advantage, and which requires only a servile imitation of objects that are but little pleasing. The painting of fishes is naturally referred to this class.

XIII. *Fruit-pieces*, of every kind, imitated from nature.

XIV. *Flower-pieces*; a charming class of painting, where Art in the hands of Huyzum, P. Segers, Merian, &c. becomes the rival of Nature. *Plants and insects* are usually referred to the painters of flowers, who with them ornament their works.

XV. *Pieces of architecture*; a kind of painting in which the Italians excel all others. Under this class may be comprehended the representations of ruins, seaports, freets, and public places; such as are seen in the works of Caneletti, and other able masters.

XVI. *Instruments of music, pieces of furniture*, and other inanimate objects; a trifling species, and in which able painters only accidentally employ their talents.

XVII. *Imitations of bas-reliefs*; a very pleasing kind of painting, and which may be carried by an able hand to a high degree of excellence.

XVIII. *Hunting pieces*: these also require a peculiar talent, as they unite the painting of men, horses, dogs, and game, to that of landscapes.

It will not be expected that we should here give the rules that the painter is to observe in handling each particular subject. What has been said on historical painting (Part I. *) may throw some light on the rest, and the particular rules must be learned from the study of the art itself. Good masters, academies of reputation, and a rational practice, are the sources from whence the young painter must derive the detail of his art. We shall however insert some rules and observations relative to *Landscape and Portrait*; these, with *History-painting* (already pretty fully treated), forming the principal branches of the art.

SECT. II. Of Landscape.

22. **LANDSCAPE-painting** includes every object that the country presents: And is distinguished into the *heroic*, and the *pastoral or rural*; of which indeed all other styles are but mixtures.

The *heroic style* is a composition of objects, which in their kinds draw both from art and nature every thing that is great and extraordinary in either. The situations are perfectly agreeable and surprising. The only buildings are temples, pyramids, ancient places of burial, altars consecrated to the divinities, pleasure-houses of regular architecture; and if nature appear not there as we every day casually see her, she is at least represented as we think the ought to be. This style is an agreeable illusion, and a sort of enchantment, when handled by a man of fine genius and a good understanding, as Poussin was, who has so happily expressed it. But if, in the course of this style, the painter has not talent enough to maintain the sublime, he is often in danger of falling into the childish manner.

The *rural style* is a representation of countries, rather abandoned to the caprice of nature, than cultivated: we there see nature simple, without ornament, and without artifice; but with all those graces wherewith she adorns herself much more when left to herself than when constrained by art.

In this style, situations bear all sorts of varieties: sometimes they are very extensive and open, to contain the flocks of the shepherds; at others very wild, for the retreat of solitary persons, and a cover for wild beasts.

It rarely happens that a painter has a genius extensive enough to embrace all the parts of painting: there is commonly some one part that pre-engages our choice, and so fills our mind, that we forget the pains that are due to the other parts; and we seldom fail to see, that those whose inclination leads them to the heroic style, think they have done all, when they have introduced into their compositions such noble objects as will raise the imagination, without ever giving themselves the trouble to study the effects of good colouring. Those, on the other hand, who practise the pastoral, apply closely to colouring, in order to represent truth more lively. Both these styles have their sectaries and partisans. Those who follow the heroic, supply by their imagination what it wants of truth, and they look no farther.

As a counterbalance to heroic landscape, it would be proper to put into the pastoral, besides a great character

* In the
sections of
Invention
and Disposition.

De Piles on
Painting.

Landscape. racter of truth, some affecting, extraordinary, but probable effect of nature, as was Titian's custom.

There is an infinity of pieces wherein both these styles happily meet; and which of the two has the ascendant, will appear from what we have been just observing of their respective properties. The chief parts of landscape are, their openings or situations, accidents, skies and clouds, off-skipps and mountains, verdure or turling, rocks, grounds or lands, terraces, fabrics, waters, fore-grounds, plants, figures and trees; of all which in their places.

23. *Of Openings or Situations.* The word *site*, or situation, signifies the "view, prospect, or opening of a country." It is derived from the Italian word *sito*; and our painters have brought it into use, either because they were used to it in Italy, or because, as we think, they found it to be very expressive.

Situations ought to be well put together; and so disengaged in their make, that the conjunction of grounds may not seem to be obstructed though we should see but a part of them.

Situations are various, and represented according to the country the painter is thinking of: as either open or close, mountainous or watery, tilled and inhabited, or wild and lonely; or, in fine, variegated by a prudent mixture of some of these. But if the painter be obliged to imitate nature in a flat and regular country, he must make it agreeable by a good disposition of the *claro-obscuro*, and such pleasing colouring as may make one soil unite with another.

It is certain, that extraordinary situations are very pleasing, and cheer the imagination by the novelty and beauty of their makes, even when the local colouring is but moderately performed: because, at work, such pictures are only looked on as unfinished, and wanting to be completed by some skilful hand in colouring; whereas common situations and objects require good colouring and absolute finishing, in order to please. It was only by these properties that Claude Lorrain has made amends for his insipid choice in most of his situations. But in whatever manner that part be executed, one of the best ways to make it valuable, and even to multiply and vary it without altering its form, is properly to imagine some ingenious accident in it.

24. *Of Accidents.* An accident in painting is an obstruction of the sun's light by the interposition of clouds, in such manner, that some parts of the earth shall be in light and others in shade, which, according to the notion of the clouds, succeed each other, and produce such wonderful effects and changes of the *claro-obscuro*, as seem to create so many new situations. This is daily observed in nature. And as this newness of situations is grounded only on the shapes of the clouds, and their motions, which are very inconstant and unequal, it follows, that these accidents are arbitrary; and a painter of genius may dispose them to his own advantage when he thinks fit to use them: For he is not absolutely obliged to do it; and there have been some able landscape-painters who have never practised it, either through fear or custom, as Claude Lorrain and some others.

25. *Of the Sky and Clouds.* The sky, in painters terms, is the ethereal part over our heads; but more particularly the air in which we breathe, and that where clouds and storms are engendered. Its colour is blue,

growing clearer as it approaches the earth, because of the interposition of vapours arising between the eye and the horizon; which, being penetrated by the light, communicates it to objects in a greater or lesser degree, as they are more or less remote.

But we must observe, that this light being either yellow or reddish in the evening, at sun-set, these same objects partake not only of the light, but of the colour: thus the yellow light mixing with the blue, which is the natural colour of the sky, alters it, and gives it a tint more or less greenish, as the yellowness of the light is more or less deep.

This observation is general and infallible: but there is an infinity of particular ones, which the painter must make upon the natural, with his pencil in his hand, when occasion offers; for there are very fine and singular effects appearing in the sky, which it is difficult to make one conceive by physical reasons. Who can tell, for example, why we see, in the bright part of some clouds, a fine red, when the source of the light which plays upon them is a most lively and distinguishing yellow? Who can account for the different reds seen in different clouds, at the very moment that these reds receive the light but in one place? for these colours and surprising appearances seem to have no relation to the rainbow, a phenomenon for which the philosophers pretend to give solid reasons.

These effects are all seen in the evening, when the weather is inclining to change, either before a storm, or after it, when it is not quite gone, but has left some remains of it to draw our attention.

The property of clouds is to be thin and airy, both in shape and colour: their shapes, though infinite, must be studied and chosen after nature, at such times as they appear fine. To make them look thin, we ought to make their grounds unite thinly with them, especially near their extremities, as if they were transparent: And if we would have them thick, their reflections must be so managed, as, without destroying their thinness, they may seem to wind and unite, if necessary, with the clouds that are next to them. Little clouds often discover a little manner, and seldom have a good effect, unless when, being near each other, they seem all together to make but one object.

In short, the character of the sky is to be luminous; and, as it is even the source of light, every thing that is upon the earth must yield to it in brightness: If however there is any thing that comes near it in light, it must be waters, and polished bodies which are susceptible of luminous reflections.

But, whilst the painter makes the sky luminous, he must not represent it always shining throughout.

On the contrary, he must contrive his light so, that the greatest part of it may fall only upon one place: and, to make it more apparent, he must take as much care as possible to put it in opposition to some terrestrial object, that may render it more lively by its dark colour; as a tree, tower, or some other building that is a little high.

This principal light might also be heightened, by a certain disposition of clouds having a supposed light, or a light ingeniously inclosed between clouds, whose sweet obscurity spreads itself by little and little on all hands. We have a great many examples of this in the Flemish school, which best understood landscape;

Landscape. as Paul Bril, Brögel, Saveri: And the Sadelers and Merian's prints give a clear idea of it, and wonderfully awaken the genius of those who have the principles of the *clarscuro*.

26. *Of Offskips and Mountains.* Offskips have a near affinity with the sky; it is the sky which determines either the force or faintness of them. They are darkest when the sky is most loaded, and brightest when it is most clear. They sometimes intermix their shapes and lights; and there are times, and countries, where the clouds pass between the mountains, whose tops rise and appear above them. Mountains that are high, and covered with snow, are very proper to produce extraordinary effects in the offskip, which are advantageous to the painter, and pleasing to the spectator.

The disposition of offskips is arbitrary; let them only agree with the whole together of the picture, and the nature of the country we would represent. They are usually blue, because of the interposition of air between them and the eye: but they lose this colour by degrees, as they come nearer the eye, and so take that which is natural to the objects.

In distancing mountains, we must observe to join them insensibly by the roundings off, which the reflections make probable; and must, among other things, avoid a certain edginess in their extremities, which makes them appear in slices, as if cut with scissors, and stuck upon the cloth.

We must further observe, that the air, at the feet of mountains, being charged with vapours, is more susceptible of light than at their tops. In this case, we suppose the main light to be set reasonably high, and to enlighten the mountains equally, or that the clouds deprive them of the light of the sun. But if we suppose the main light to be very low, and to strike the mountains; then their tops will be strongly enlightened, as well as every thing else in the same degree of light.

Though the forms of things diminish in bigness, and colours lose their strength, in proportion as they recede from the first plan of the picture, to the most remote offskip, as we observe in nature and common practice; yet this does not exclude the use of the accidents. These contribute greatly to the wonderful in landscape, when they are properly introduced, and when the artist has a just idea of their good effects.

27. *Of Verdure, or Turfing.* By turfing is meant the greenness with which the herbs colour the ground: This is done several ways; and the diversity proceeds not only from the nature of plants, which, for the most part, have their particular verdurs, but also from the change of seasons, and the colour of the earth, when the herbs are but thin sown. By this variety, a painter may choose or unite, in the same tract of land, several sorts of greens, intermixed and blended together, which are often of great service to those who know how to use them; because this diversity of greens, as it is often found in nature, gives a character of truth to those parts, where it is properly used. There is a wonderful example of this part of landscape, in the view of Mechlin, by Rubens.

28. *Of Rocks.* Though rocks have all sorts of shapes, and participate of all colours, yet there are, in their diversity, certain characters which cannot be

well expressed without having recourse to nature. Landscape. Some are in banks, and set off with beds of shrubs; others in huge blocks, either projecting or falling back; others consist of large broken parts, contiguous to each other; and others, in short, of an enormous size, all in one stone, either naturally, as free-stone, or else through the injuries of time, which in the course of many ages has worn away their marks of separation. But, whatever their form be, they are usually set out with clefts, breaks, hollows, bushes, moss, and the stains of time; and these particulars, well managed, create a certain idea of truth.

Rocks are of themselves gloomy, and only proper for solitudes: but where accompanied with bushes, they inspire a fresh air; and, when they have waters, either proceeding from, or washing them, they give an infinite pleasure, and seem to have a soul which animates them, and makes them sociable.

29. *Of Grounds or Lands.* A ground or land, in painters terms, is a certain distinct piece of land, which is neither too woody nor hilly. Grounds contribute, more than any thing, to the gradation and distancing of landscape; because they follow one another, either in shape, or in the *claro-scuro*, or in their variety of colouring, or by some sensible conjunction of one with another.

Multiplicity of grounds, though it be often contrary to grand manner, does not quite destroy it; for, besides the extent of country which it exhibits, it is susceptible of the accidents we have mentioned, and which, with good management, have a fine effect.

There is one nicety to be observed in grounds, which is, that in order to characterize them well, care must be taken, that the trees in them have a different verdure and different colours from those grounds; though this difference, withal, must not be too apparent.

30. *Of Terraces.* A terrace, in painting, is a piece of ground, either quite naked, or having very little herbage, like great roads and places often frequented. They are of use chiefly in the foregrounds of a picture, where they ought to be very spacious and open, and accompanied, if we think fit, with some accidental verdure, and also with some stones, which, if placed with judgment, give a terrace a greater air of probability.

31. *Of Buildings.* Painters mean by buildings any structures they generally represent, but chiefly such as are of a regular architecture, or at least are most conspicuous. Thus building is not so proper a name for the houses of country-people, or the cottages of shepherds, which are introduced into the rural taste, as for regular and showy edifices, which are always brought into the *heroic*.

Buildings in general are a great ornament in landscapes, even when they are Gothic, or appear partly inhabited and partly ruinous: they raise the imagination by the use they are thought to be designed for; as appears from ancient towers, which seem to have been the habitations of fairies, and are now retreats for shepherds and owls.

Poussin has very elegantly handled the Roman manner of architecture in his works, as Bourbon has done the Gothic; which, however Gothic, fails not to give a sublime air to his landscapes. Little Bernard has introduced

introduced into his sacred history what may be called a Babylonian manner; which, extraordinary as it is, has its grandeur and magnificence. Nor ought such pieces of architecture to be quite rejected: they raise the imagination; and perhaps would succeed in the heroic style, if they were placed among half-distant objects, and if we knew how to use them properly.

32. *Of Waters.* Much of the spirit of landscape is owing to the waters which are introduced in it. They appear in divers manners; sometimes impetuous, as when a storm makes them overflow their banks; at other times rebounding, as by the fall of a rock; at other times, through unusual pressure, gushing out and dividing into an infinity of silver streams, whose motion and murmuring agreeably deceive both the eye and ear; at other times calm and purling in a sandy bed; at other times to fill and standing, as to become a faithful looking-glass, which doubles all the objects that are opposite to it; and in this state they have more life than in the most violent agitation. Consult Bourdon's works, or at least his prints, on this subject: he is one of those who have treated of waters with the greatest spirit and best genius.

Waters are not proper for every situation: but to express them well, the artist ought to be perfect master of the exactness of watery reflexions; because they only make painted water appear as real: for practice alone, without exactness, destroys the effect, and abates the pleasure of the eye. The rule for these reflexions is very easy, and therefore the painter is the less pardonable for neglecting it.

But it must be observed, that though water be as a looking-glass, yet it does not faithfully represent objects but when it is still; for if it be in any motion, either in a natural course, or by the driving of the wind, its surface, becoming uneven, receives on its surges such lights and shades, as, mixing with the appearance of the objects, confound both their shapes and colours.

33. *Of the Foreground of a Picture.* As it is the part of the foreground to usher the eye into the piece, great care must be taken that the eye meet with good reception; sometimes by the opening of a fine terrace, whose design and workmanship may be equally curious; sometimes by a variety of well-distinguished plants, and those sometimes flowered; and at other times, by figures in a lively taste, or other objects, either admirable for their novelty, or introduced as by chance.

In a word, the artist cannot too much study his foreground objects, since they attract the eye, impress the first character of truth, and greatly contribute to make the artifice of a picture successful, and to anticipate our esteem for the whole work.

34. *Of Plants.* Plants are not always necessary in foregrounds, because, as we have observed, there are several ways of making those grounds agreeable. But if we resolve to draw plants there, we ought to paint them exactly after the life; or at least, among such as we paint practically, there ought to be some more finished than the rest, and whose kinds may be distinguished by the difference of design and colouring, to the end that, by a probable supposition, they may give the others a character of truth. What has been said here of plants, may be applied to the branches and barks of trees.

35. *Of Figures.* In composing landscape, the artist may have intended to give it a character agreeable to the subject he has chosen, and which his figures ought to represent. He may also, and it commonly happens, have only thought of his figures, after finishing his landscape. The truth is, the figures in most landscapes are made rather to accompany than to suit them.

It is true, there are landscapes so disposed and situated, as to require only passing figures; which several good masters, each in his style, have introduced, as Poussin in the heroic, and Fouquier in the rural, with all probability and grace. It is true also, that resting figures have been made to appear inwardly active. And these two different ways of treating figures are not to be blamed, because they act equally, tho' in a different manner. It is rather inaction that ought to be blamed in figures; for in this condition, which robs them of all connection with the landscape, they appear to be pasted on. But without obstructing the painter's liberty in this respect, undoubtedly the best way to make figures valuable is, to make them so to agree with the character of the landscape, that it may seem to have been made purely for the figures. We would not have them either insipid or indifferent, but to represent some little subject to awaken the spectator's attention, or else to give the picture a name of distinction among the curious.

Great care must be taken to proportion the size of the figures to the bigness of the trees, and other objects of the landscape. If they be too large, the picture will discover a little manner; and if too small, they will have the air of pigmies: which will destroy the worth of them, and make the landscape look enormous. There is, however, a greater inconvenience in making figures too large than too small; because the latter at least gives an air of greatness to all the rest. But as landscape figures are generally small, they must be touched with spirit, and such lively figures as will attract, and yet preserve probability and a general union. The artist must, in fine, remember, that as the figures chiefly give life to a landscape, they must be dispersed as conveniently as possible.

36. *Of Trees.* The beauty of trees is perhaps one of the greatest ornaments of landscape; on account of the variety of their kinds, and their freshness, but chiefly their lightness, which makes them seem, as being exposed to the air, to be always in motion.

Though diversity be pleasing in all the objects of landscape, it is chiefly in trees that it shews its greatest beauty. Landscape considers both their kinds and their forms. Their kinds require the painter's particular study and attention, in order to distinguish them from each other; for we must be able at first sight to discover which are oaks, elms, firs, fycamores, poplars, willows, pines, and other such trees, which, by a specific colour, or touching, are distinguishable from all other kinds. This study is too large to be acquired in all its extent; and, indeed, few painters have attained such a competent exactness in it as their art requires. But it is evident, that those who come nearest to perfection in it, will make their works infinitely pleasing, and gain a great name.

Besides the variety which is found in each kind of tree, there is in all trees a general variety. This is observed in the different manners in which their branches

are disposed by a sport of nature; which takes delight in making some very vigorous and thick, others more dry and thin; some more green, others more red or yellow. The excellence of practice lies in the mixture of these varieties: but if the artist can distinguish the sorts but indifferently, he ought at least to vary their makes and colours; because repetition in landscape is as tiresome to the eye, as monotony in discourse is to the ear.

The variety of their makes is so great, that the painter would be inexorable not to put it in practice upon occasion, especially when he finds it necessary to awaken the spectator's attention; for, among trees, we discover the young and the old, the open and close, tapering, and squat, bending upwards and downwards, flooping and shooting: in short, the variety is rather to be conceived than expressed. For instance, the character of young trees is, to have long slender branches, few in number, but well set out; boughs well divided, and the foliage vigorous and well shaped: whereas, in old trees, the branches are short, stocky, thick, and numerous; the tufts blunt, and the foliage unequal and ill shaped: but a little observation and genius will make us perfectly sensible of these particulars.

In the various makes of trees, there must also be a distribution of branches, that has a just relation to, and probable connection with, the boughs or tufts, so as mutually to assist each other in giving the tree an appearance of thickness and of truth. But, whatever their natures or manners of branching be, let it be remembered, that the handling must be lively and thin, in order to preserve the spirit of their characters.

Trees likewise vary in their barks, which are commonly grey; but this grey, which in thick air, and low and marshy places, looks blackish, appears lighter in a clear air: and it often happens, in dry places, that the bark gathers a thin moss, which makes it look quite yellow; so that, to make the bark of a tree apparent, the painter may suppose it to be light upon a dark ground, and dark on a light one.

The observation of the different barks merits a particular attention; for it will appear, that, in hard woods, age chaps them, and thereby gives them a sort of embroidery; and that, in proportion as they grow old, these chaps grow more deep. And other accidents in barks may arise either from moisture, or dryness, or green mosses, or white stains of several trees.

The barks of white woods will also afford much matter for practice, if their diversity be fully studied: and this consideration leads us to say something of the study of landscape.

37. *Of the study of Landscape.* The study of landscape may be considered either with respect to beginners, or to those who have made some advances in it.

Beginners will find, in practice, that the chief trouble of landscape lies in handling trees; and it is not only in practice, but also in speculation, that trees are the most difficult part of landscape, as they are its greatest ornament. But it is only proposed here, to give beginners an idea of trees in general, and to shew them how to express them well. It would be needless to point out to them the common effects of trees and plants, because they are obvious to every one;

yet there are some things, which, though not unknown, deserve our reflection. We know, for instance, that all trees require air, some more, some less, as the chief cause of their vegetation and production; and for this reason, all trees (except the cypress, and some others of the same kind) separate in their growth from one another and from other strange bodies as much as possible, and their branches and foliage do the same: wherefore, to give them that air and thinness, which is their principal character, the branches, boughs, and foliage, must appear to fly from each other, to proceed from opposite parts, and be well divided. And all this without order; as if chance aided nature in the fanciful diversity. But to say particularly how these trunks, branches, and foliages, ought to be distributed, would be needless, and only a description of the works of great masters: a little reflection on nature will be of more service than all that can be said on this head. By great masters, we mean, such as have published prints; for those will give better ideas to young copyists, than even the paintings themselves.

Among the many great masters of all schools, Du Pile prefers Titian's wooden prints, where the trees are well-shaped; and those which Cornelius Cort, and Agostino Carracche, have engraved. And he asserts, that beginners can do no better than contract, above all things, an habit of imitating the touches of these great masters, and of considering, at the same time, the perspective of the branches and foliages, and observing how they appear, either when rising and seen from below, or when sinking and seen from above, or when fronting and viewed from a point, or when they appear in profile; and, in a word, when set in the various views in which nature presents them, without altering their characters.

After having studied and copied, with the pen or crayon, first the prints, and then the designs of Titian and Carracche, the student should imitate with the pencil those touches which they have most distinctly specified, if their paintings can be procured: but since they are scarce, others should be got which have a good character for their touching; as those of Fouquier, who is a most excellent model: Paul Bril, Breugel, and Bourdon, are also very good; their touching is neat, lively, and thin.

After having duly examined the nature of trees, their spread and order, and the disposition of their branches, the artist must get a lively idea of them, in order to keep up the spirit of them throughout, either by making them apparent and distinct in the foregrounds, or obscure and confused in proportion to their distance.

After having thus gained some knowledge in good manner, it will next be proper to study after nature, and to choose and rectify it according to the idea which the aforesaid great masters had of it. As to perfection, it can only be expected from long practice and perseverance. This, we think, is what concerns those, who, having an inclination for landscape, would take the proper methods for beginning it well.

As for those who have made some advances in this part of painting, it is proper they should collect the necessary materials for their further improvement, and study

Landscape. study those objects at least, which they shall have most frequent occasion to represent.

Painters usually comprize, under the word *study*, any thing whatever, which they either design or paint separately, after the life; whether figures, heads, feet, hands, draperies, animals, mountains, trees, plants, flowers, fruits, or whatever may confirm them in the just imitation of nature: the drawing of these things is what they call *study*; whether they be for instruction in design, or only to assure them of the truth, and to perfect their work. In fact, this word *study* is the more properly used by painters, as in the diversity of nature they are daily making new discoveries, and confirming themselves in what they already know.

As the landscape-painter need only study such objects as are to be met with in the country, we would recommend to him some order, that his drawings may be always at hand when he wants them. For instance, he should copy after nature, on separate papers, the different effects of trees in general, and the different effects of each kind in particular, with their trunks, foliage, and colours. He should also take the same method with some sorts of plants; because their variety is a great ornament to terraces on fore-grounds. He ought likewise to study the effects of the sky in the several times of the day, and seasons of the year, in the various dispositions of clouds, both in serene, thundering, and stormy weather; and in the off-skip, the several sorts of rocks, waters, and other principal objects.

These drawings, which may be made at times, should be collected together; and all that relate to one matter be put into a book, to which the artist may have recourse at any time for what he wants.

Now, if the fine effects of nature, whether in shape or colour, whether for an entire picture or a part of one, be the artist's study; and if the difficulty lies in choosing those effects well, he must for this purpose be born with good sense, good taste, and a fine genius; and this genius must be cultivated by the observations which ought to be made on the works of the best masters, how they choose nature, and how, while they corrected her, according to their art, they preserved her character. With these advantages, derived from nature, and perfected by art, the painter cannot fail to make a good choice; and, by distinguishing between the good and the bad, must needs find great instruction, even from the most common things.

To improve themselves in this kind of studies, painters have taken several methods.

There are some artists who have designed after nature, and in the open fields; and have there quite finished those parts which they had chosen, but without adding any colour to them.

Others have drawn, in oil-colours, in a middle-tint, on strong paper; and found this method convenient, because, the colours sinking, they could put colour on colour, though different from each other. For this purpose they took with them a flat box, which commodiously held their pallet, pencils, oil, and colours. This method, which indeed requires several implements, is doubtless the best for drawing nature more particularly, and with greater exactness, especially if, after the work be dry and varnished, the artist return

to the place where he drew, and retouch the principal things after nature.

Others have only drawn the out-lines of objects, and slightly washed them in colours near the life, for the ease of their memory. Others have attentively observed such parts as they had a mind to retain, and contented themselves with committing them to their memory, which upon occasion gave them a faithful account of them. Others have made drawings in pastel and wash together. Others, with more curiosity and patience, have gone several times to the places which were to their taste: the first time they only made choice of the parts, and drew them correctly; and the other times were spent in observing the variety of colouring, and its alterations through change of light.

Now these several methods are very good, and each may be practised as best suits the student and his temper: but they require the necessities of painting, as colours, pencils, pastels, and leisure. Nature, however, at certain times, presents extraordinary, but transient beauties, and such as can be of no service to the artist who has not as much time as is necessary to imitate what he admires. The best way, perhaps, to make advantage of such momentary occasions, is this:

The painter being provided with a quire of paper, and a black-lead pencil, let him quickly, but slightly, design what he sees extraordinary; and, to remember the colouring, let him mark the principal parts with characters, which he may explain at the bottom of the paper, as far as is necessary for himself to understand them: a cloud, for instance, may be marked A, another cloud B, a light C, a mountain D, a terrace E, and so on. And having repeated these letters at the bottom of the paper, let him write against each, that it is of such or such a colour; or for greater brevity, only *blue, red, violet, grey, &c.* or any other shorter abbreviation. After this, he must go to painting as soon as possible; otherwise most of what he has observed will, in a little time, slip out of his memory. This method is the more useful, as it not only prevents our losing an infinity of sudden and transitory beauties, but also helps, by means of the aforesaid marks and characters, to perfect the other methods we have mentioned.

If it be asked, Which is the properest time for these studies? the answer is, That nature should be studied at all times, because she is to be represented at all seasons; but autumn yields the most plentiful harvest for her fine effects: the mildness of that season, the beauty of the sky, the richness of the earth, and the variety of objects, are powerful inducements with the painter to make the proper inquiries for improving his genius and perfecting his art.

But as we cannot see or observe every thing, it is very commendable to make use of other men's studies, and to look upon them as if they were our own. Raphael sent some young men into Greece to design such things as he thought would be of service to him, and accordingly made use of them to as good purpose as if he himself had designed them on the spot: for this, Raphael is so far from deserving censure, that he ought, on the contrary, to be commended; as an example, that painters ought to leave no way untried for improving in their professions. The landscape painter

Landscape. may, accordingly, make use of the works of all those who have excelled in any kind, in order to acquire a good manner; like the bees, which gather their variety of honey from different flowers.

38. *General remarks on Landscapes.* As the general rules of painting are the basis of all the several kinds of it, we must refer the landscape painter to them, or rather suppose him to be well acquainted with them. We shall here only make some general remarks on this kind of painting.

I. Landscape supposes the knowledge and practice of the principal rules in *perspective*, in order to maintain probability.

II. The higher the leaves of trees are to the earth, the larger they are, and the greener; as being aptest to receive, in abundance, the sap which nourishes them; and the upper branches begin first to take the redness or yellowness which colours them in autumn. But it is otherwise in plants; for their stalks renew all the year round, and their leaves succeed one another, at a considerable distance of time, inasmuch that nature, employed in producing new leaves to adorn the stock as it rises, does by degrees desert the under ones; which, having first performed their office, are the first that die: but this effect is more visible in some than in others.

III. The under parts of all leaves are of a brighter green than the upper, and almost always incline to the silverish; and those which are wind-shaken are known from others by that colour: but if we view them from beneath, when penetrated by the sun's rays, they discover such a fine and lively green as is far beyond all comparison.

IV. There are five principal things which give spirit to landscape, *viz.* figures, animals, waters, wind-shaken trees, and thinnefs of pencilling; to which add smoke, when there is occasion to introduce it.

V. When one colour predominates throughout a landscape, as one green in spring, or one red in autumn, the piece will look either as of one colour, or else as unfinished. We have seen many of Bourdon's landscapes, which, by handling the corn one way throughout, have lost much of their beauty, though the situations and waters were very pleasant. The ingenious painter must endeavour to correct, and, as they say, redeem the harsh unlightly colouring of winter and spring by means of figures, waters, and buildings; for summer and autumn subjects are of themselves capable of great variety.

VI. Titian and Carrache are the best models for inspiring good taste, and leading the painter into a good track, with regard to forms and colours. He must use all his efforts to gain a just idea of the principles which those great men have left us in their works; and to have his imagination filled with them, if he would advance by degrees towards that perfection which the artist should always have in view.

VII. The landscapes of these two masters teach us a great many things, of which discourse can give us no exact idea, nor any general principle. Which way, for example, can the measures of trees in general be determined, as we determine those of the human body? The tree has no settled proportions; most of its beauty lies in the contrast of its branches, an unequal distribution of boughs, and, in short, a kind of whim-

sical variety, which nature delights in, and of which the painter becomes a judge when he has thoroughly relished the works of the two masters aforesaid. But we must say, in Titian's praise, that the path he struck out is the surest; because he has exactly imitated nature in its variety with an exquisite taste, and fine colouring: whereas Carrache, though an able artist, has not, more than others, been free from manner in his landscapes.

VIII. One of the greatest perfections of landscape, in the variety it represents, is a faithful imitation of each particular character: as its greatest fault is, a licentious practice, which brings us to do things by rote.

IX. Among those things which are painted practically, we ought to intermix some done after nature, to induce the spectator to believe that all are so.

X. As there are styles of thought, so there are also styles of execution. We have handled the two relating to thought, *viz.* the heroic and pastoral; and find that there are two also with regard to execution, *viz.* the firm style, and the polished; these two concern the pencil, and the more or less ingenious way of conducting it. The firm style gives life to work, and excuse for bad choice; and the polished finishes and brightens every thing; it leaves no employment for the spectator's imagination, which pleases itself in discovering and finishing things which it ascribes to the artist, though, in fact, they proceed only from itself. The polished style degenerates into the soft and dull, if not supported by a good opening or situation; but when those two characters meet, the picture is fine.

SECT. III. Of Portraiture.

39. If painting be an imitation of nature, it is doubly so in a portrait; which not only represents a man in general, but such an one as may be distinguished from all others. And as the greatest perfection of a portrait is extreme likeness, so the greatest of its faults is to resemble a person for whom it was not made; since there are not in the world two persons quite like one another. But before we proceed to the particulars which let us into the knowledge of this imitation, it is necessary, for shortening this part of our subject, to attend to some general propositions.

I. Imitation is the essence of painting: and good choice is to this essence what the virtues are to a man; they raise the value of it. For this reason, it is extremely the painter's interest to choose none but good heads, or favourable moments for drawing them, and such positions as may supply the want of a fine natural.

II. There are views of the natural, more or less advantageous; all depends upon turning it well, and taking it in the favourable moment.

III. There is not a single person in the world who has not a peculiar character, both in body and face.

IV. Simple and genuine nature is more proper for imitation; and is a better choice than nature much formed, and embellished too artificially.

V. To adorn nature too much, is doing it a violence; and the action which attends it can never be free, when its ornaments are not easy. In short, in proportion as we adorn nature, we make it degenerate from itself, and

Portraiture. and bring it down to art.

VI. Some means are more advantageous than others, to come at the same end.

VII. We must not only imitate what we do see in nature, but also what we may possibly see that is advantageous in art.

VIII. Things are valuable by comparison; and it is only by this we are enabled to make a right judgment of them.

IX. Painters easily accustom themselves to their own tints, and the manner of their masters: and after this habit is rooted in them, they view nature, not as she really is, but as they are used to paint her.

X. It is very difficult to make a picture, the figures of which are as big as the life, to have its effect near, as at a distance. A learned picture pleases the ignorant only when it is at some distance; but judges will admire its artifice near, and its effect at a distance.

XI. Knowledge makes work pleasant and easy. The traveller who knows his road, comes to his journey's end with more speed and certainty than he who inquires and gropes it out.

XII. It is proper, before we begin a work, to meditate upon it, and to make a nice coloured sketch of it, for our own satisfaction, and an help to the memory.

We cannot too much reflect on these propositions; and it is necessary to be well acquainted with them, that they may present themselves to our mind, of their own accord, without our being at the trouble to recal them to our memory, when we are at work.

There are four things necessary to make a portrait perfect; *air, colouring, attitude, and dress.*

40. *Of Air.* The air respects the lines of the face, the head-attire, and the size.

The lines of the face depend upon exactness of draught, and agreement of the parts; which all together must represent the physiognomy of the person painted in such a manner, that the picture of his body may seem to be also that of his mind.

It is not exactness of design in portraits that gives spirit and true air, so much as the agreement of the parts at the very moment when the disposition and temperament of the sitter are to be hit off. We see several portraits which, though correctly designed, have a cold, languishing, and stupid air; whilst others, less correct in design, strike us however, at first sight, with the sitter's character.

Few painters have been careful enough to put the parts well together: Sometimes the mouth is smiling, and the eyes are sad; at other times, the eyes are cheerful, and the cheeks lank: by which means their work has a false air, and looks unnatural. We ought therefore to mind, that, when the sitter puts on a smiling air, the eyes close, the corners of the mouth draw up towards the nostrils, the cheeks swell, and the eye-brows widen: but in a melancholy air, these parts have a contrary effect.

The eye-brows, being raised, give a grave and noble air; but if arched, an air of astonishment.

Of all the parts of the face, that which contributes most to likeness is the nose; it is therefore of great moment to set and draw it well.

Though the hair of the head seems to be part of the dress, which is capable of various forms, without altering the air of the face; yet the head-attire which one has been most accustomed to creates such a likeness, that we scarce know a familiar acquaintance on his putting on a periwig somewhat different from that which he used to wear. It is necessary therefore, as far as possible, to take the air of the head-ornament, and make it accompany and set off that of the face, if there be no reason to the contrary.

As to the stature, it contributes so much to likeness, that we very often know people without seeing their face: It is therefore extremely proper to draw the size after the sitter himself, and in such an attitude as we think fit; which was Vandyke's method. Here let us remark, that, in sitting, the person appears to be of a less free make, through the heaving of his shoulders; wherefore, to adjust his size, it is proper to make him stand for a small time, swaying in the posture we would give him, and then make our observation. But here occurs a difficulty, which we shall endeavour to examine: "Whether it is proper, in portraiture, to correct the defects of nature?"

Likeness being the essence of portraiture, it would seem that we ought to imitate defects as well as beauties, since by this means the imitation will be more complete: It would be even hard to prove the contrary to one who would undertake the defence of this position. But ladies and gentlemen do not much approve of those painters who entertain such sentiments, and put them in practice. It is certain that some complaisance in this respect is due to them; and there is little doubt but their pictures may be made to resemble, without displeasing them: for the effectual likeness is a just agreement of the parts that are painted with those of nature; so that we may be at no loss to know the air of the face, and the temper of the person, whose picture is before us. All deformities, therefore, when the air and temper may be discovered without them, ought to be either corrected or omitted in womens and young mens portraits. A nose somewhat awry may be helped, or a thrivelled neck, or high shoulders, adapted to good air, without going from one extreme to another. But this must be done with great discretion: for, by endeavouring to correct nature too much, we insensibly fall into a method of giving a general air to all our portraits; just as, by confining ourselves too much to the defects and littleness of nature, we are in danger of falling into the low and tasteless manner.

But in the faces of heroes and men of rank, distinguished either by dignities, virtues, or great qualities, we cannot be too exact, whether the parts be beautiful or not: for portraits of such persons are to be standing monuments to posterity; in which case, every thing in a picture is precious that is faithful. But after whatever manner the painter acquires himself in this point, let him never forget good air nor grace; and that there are, in the natural, advantageous moments for hitting them off.

41. *Of Colouring.*—Colouring, in portraiture, is an effusion of nature, discovering the true tempers of persons; and the temper being essential to likeness, it ought to be handled as exactly as the design. This part is the more valuable, as it is rare and difficult to hit. A great many painters have come to a likeness by strokes and outlines;

Portraiture.

Portraiture.

outlines; but certainly they are few who have shewn in colours the tempers of persons.

Two points are necessary in colouring; exactness of tints, and the art of setting them off. The former is acquired by practice, in examining and comparing the colours we see in life with those by which we would imitate it: and the art of those tints consists in knowing what one colour will produce when set by another, and in making good what either distance or time may abate of the glow and freshness of the colours.

A painter who does nothing more than what he sees, will never arrive at a perfect imitation; for though his work may seem, on the easel, to be good to him, it may not appear so to others, and perhaps even to himself, at a distance. A tint which, near, appears disjoined, and of one colour, may look of another at a distance, and be confounded in the mass it belongs to. If you would have your work, therefore, to produce a good effect in the place where it is to hang, both the colours and lights must be a little loaded; but learnedly, and with discretion. In this point consult Titian, Rubens, Vandyke, and Rembrandt's methods; for indeed their art is wonderful.

The tints usually require three times of observation. The first is at the person's first sitting down, when he has more spirit and colour than ordinary; and this is to be noted in the first hour of his sitting. The second is when, being composed, his look is as usual; which is to be observed in the second hour. And the third is when, through tiredness, by sitting in one posture, his colour alters to what weariness usually creates. On which account, it is best to keep to the sitter's usual tint, a little improved. He may also rise, and take some turns about the room, to gain fresh spirits, and shake off or prevent tiredness.

In *draperies*, all sorts of colours do not suit all sorts of persons. In mens portraits, we need only observe great truth, and great force: but in womens there must also be charms; whatever beauty they have must appear in a fine light, and their blemishes must by some means or other be softened. For this reason, a white, lively, and bright tint, ought never to be set off by a fine yellow, which would make it look like plaster; but rather by colours inclining to green, blue, or grey, or such others as, by their opposition, may make the tint appear more fleshy than usual in fair women. Vandyke often made a fillemot-coloured curtain for his ground; but that colour is soft and brown. Brown women, on the other hand, who have yellow enough in their tints to support the character of fleshiness, may very well have yellowish draperies, in order to bring down the yellow of their tints, and make them look the fresher; and, near very high-coloured and lively carnations, linen does wonders.

In *grounds*, two things are observable; the tone and the colour. The colour is to be considered in the same manner as those of draperies, with respect to the head. The tone must be always different from the mass it supports, and of which it is the ground, that the objects coming upon it may not seem transparent, but solid and raised. The colour of the hair of the head usually determines the tone of the ground; and when the former is a bright chestnut, we are often embarrassed, unless helped by means of a curtain, or some accident of the *claro-obsuro*, supposed to be behind, or

unless the ground is a sky.

We must further observe, that where a ground is neither curtain nor landscape, or such like, but is plain and like a wall, it ought to very much party-coloured, with almost imperceptible patches or stains; for, besides its being so in nature, the picture will look the more grand.

42. *Of Attitude, or Posture.* Attitudes ought to suit the ages and qualities of persons and their tempers. In old men and women, they should be grave, majestic, and sometimes bold; and generally, in women, they ought to have a noble simplicity and modest cheerfulness; for modesty ought to be the character of women; a charm infinitely beyond coquetry! and indeed coquettes themselves care not to be painted such.

Attitudes are of two kinds; one in motion, the other at rest. Those at rest may suit every person: but those in motion are proper for young people only, and are hard to be expressed; because a great part of the hair and drapery must be moved by the air; motion, in painting, being never better expressed than by such agitations. The attitudes at rest must not appear so much at rest as to seem to represent an inactive person, and one who sits for no other purpose but to be a copy. And though the figure that is represented be at rest, yet the painter, if he thinks fit, may give it a flying drapery, provided the scene or ground be not a chamber or close place.

It is above all things necessary that the figures which are not employed should appear to satisfy the spectator's curiosity; and for this purpose shew themselves in such an action as suits their tempers and conditions, as if they would inform him what they really were: and as most people pretend to sincerity, honesty, and greatness of mind, we must avoid, in attitudes, all manner of affectation; every thing there must appear easy and natural, and discover more or less spirit, nobleness, and majesty, in proportion to the person's character and dignity. In a word, the attitudes are the language of portraits; and the skilful painter ought to give great attention to them.

But the best attitudes are such as induce the spectator to think that the sitter took a favourable opportunity of being seen to advantage, and without affectation. There is only one thing to be observed with regard to womens portraits, in whatever attitude they are placed; which is, that they sway in such a manner as to give their face but little shade; and that we carefully examine whether the lady appear most beautiful in a smiling or in a serious air, and conduct ourselves accordingly. Let us now proceed to the next article.

43. *Of Practice in Portraiture.* According to De Piles, portraiture requires three different sittings and operations; to wit, dead-colouring, second-colouring, and retouching or finishing. Before the painter dead-colour, he must attentively consider what aspect will best suit the sitter, by putting him in different positions, if we have not any settled design before us: and when we have determined this, it is of the last consequence to put the parts well together, by comparing always one part with another; for not only the portrait acquires a greater likeness when well designed, but it is troublesome to make alterations at the second sitting, when the artist must only think of painting, that

Portraiture, that is, of disposing and uniting his colours.

Experience tells us, that the dead-colouring ought to be clean, because of the slope and transparency of the colours, especially in the shades: and when the parts are well put together, and become clammy, they must be judiciously sweetened and melted into each other; yet without taking away the air of the picture, that the painter may have the pleasure of finishing it, in proportion as he draws. But if fiery genives do not like this method of scumbling, let them only mark the parts slightly, and so far as is necessary, for giving an air.

In dead-colouring, it is proper to put in rather too little than too much hair about the forehead; that, in finishing, we may be at liberty to place it where we please, and to paint it with all possible softness and delicacy. If, on the contrary, you sketch upon the forehead a lock which may appear to be of a good taste, and becoming the work, you may be puzzled in finishing it, and not find the life exactly in the same position as you would paint it. But this observation is not meant for men of skill and consummate experience, who have nature in their heads, and make her submit to their ideas.

The business of the second sitting is, to put the colours well in their places, and to paint them in a manner that is suitable to the sitter and to the effect we propose: But before they are made clammy, we ought to examine afresh whether the parts are rightly placed, and here and there to give some touches towards likeness, that, when we are assured of it, the work may go on with greater satisfaction. If the painter understands what he is about, and the portrait be justly designed, he ought as much as possible to work quick; the sitter will be better pleased, and the work will by this means have the more spirit and life. But this readiness is only the effect of long study and experience; for we may well be allowed a considerable time to find out a road that is easy, and such as we must often travel in.

Before we retouch or finish, it is proper to terminate the hair, that, on finishing the carnations, we may be able to judge of the effect of the whole head.

If, at the second sitting, we cannot do all we intended, which often happens, the third makes up the loss, and gives both spirit, physiognomy, and character.

If we would paint a portrait at once, we must load the colouring; but neither sweeten, nor drive, nor very much oil it: and if we dip the pencil in varnish as the work advances, this will readily enable us to put colour on colour, and to mix them without driving.

The use and sight of good pictures give greater light into things than words can express: What hits one artist's understanding and temper may be disagreeable to another's; and almost all painters have taken different ways, though their principles were often the same.

We are told that a friend of Vandyke's having observed to him how little time he bestowed on his portraits, Vandyke answered, "That at first he worked hard, and took great pains, to acquire a reputation, and also to get a swift hand, against the time he should work for his kitchen." Vandyke's custom is said to have been this: He appointed both the day and hour

for the person's sitting, and worked not above an hour on any portrait, either in rubbing in or finishing; so that as soon as his clock informed him that the hour was out, he rose up, and made a bow to the sitter, to signify, that he had done enough for that day, and then appointed another hour some other day; whereupon his servant came to clean his pencils, and brought a fresh pallet, whilst he was receiving another sitter, whose day and hour he had before appointed. By this method he worked on several pictures the same day, with extraordinary expedition.

After having lightly dead-coloured the face, he put the sitter into some attitude which he had before contrived; and on a grey paper, with white and black crayons, he designed, in a quarter of an hour, his shape and drapery, which he disposed in a grand manner and an exquisite taste. After this, he gave the drawing to the skilful people he had about him, to paint after the sitter's own cloaths, which, at Vandyke's request, were sent to him for that purpose. When his disciples had done what they could to these draperies, he lightly went over them again; and so, in a little time, by his great knowledge, displayed the art and truth which we at this day admire in them. As for hands, he had in his house people of both sexes, whom he paid, and who served as models.

This conduct of Vandyke, however, is mentioned rather to gratify the reader's curiosity, than to excite his imitation; he may choose as much of it as he pleases and as suits his own genius, and leave the rest.

We must observe by the way, that there is nothing so rare as fine hands, either in the design or colouring. It is therefore convenient to cultivate, if we can, a friendship with some women who will take pleasure in serving for a copy: The way to win them is, to praise their beauty exceedingly. But if an opportunity serves of copying hands after Vandyke, it must not be let slip; for he drew them with a surprising delicacy, and an admirable colouring.

It is of great service to copy after the manners which come nearest to nature; as are those of Titian and Vandyke. We must, at such times, believe them to be nature itself; and, at some distance, consider them as such, and say to ourselves—*What colour and tint shall I use for such a part?* And then, coming near the picture, we ought to examine, whether we are right, or not; and to make a fixed rule of what we have discovered, and did not practise before without uncertainty.

It is recommended, before we begin colouring, to catch the very first moments, which are commonly the most agreeable and most advantageous, and to keep them in our memory for use when we are finishing: for the sitter, growing tired with being long in the same place, loses those spirits, which, at his first sitting down, gave beauty to the parts, and conveyed to the tint more lively blood, and a fresher colour. In short, we must join to truth a probable and advantageous possibility, which, far from abating likeness, serves rather to set it off. For this end, we ought to begin with observing the ground of a tint, as well what it is in lights as in shades; for the shades are only beautiful as they are proportioned to the light. We must observe if the tint be very lively; whether it partake of yellowness, and where that yellowness is placed;

Decorations
&c.

placed; because usually, towards the end of the sitting, fatigue diffuses a general yellowness, which makes us forget what parts were of this colour, and what were not, unless we had taken due notice of it before. For this reason, at the second sitting, the colours must be every-where readily clapped in, and such as appear at the first sitting down; for these are always the finest.

The surest way to judge of colours is by comparison; and to know a tint, nothing is better than to compare it with linen placed next it, or else placed next to the natural object, if there is occasion. We say this only to those who have little practised nature.

The portrait being now supposed to be as much finished as you are able, nothing remains, but, at some reasonable distance, to view both the picture and sitter together, in order to determine with certainty, whether there is any thing still wanting to perfect the work.

SECT. IV. *Of Theatric Decorations; the Designs for Furniture, Embroidery, Carriages, &c.*

46. *Of Theatrical Decorations.* This is a particular art which unites several of the general parts of painting with the knowledge of architecture, perspective, &c. They who apply themselves to it, would do well to design their decorations by day, and to colour them by candle-light, as they will be much better able to judge of the effect of a painting intended to be viewed by that light. It is proper also to caution the young painter to avoid, as much as possible, the uniting the imitations of nature with nature itself; that is, he should not introduce with his decorations living horses, or other animals, real fountains or cascades, trees, or statues, &c. For such combinations are the effect of ignorance and a bad taste; they are the resource of painters of little ability; they discover a sterility of invention, and produce great inconvenience in the representation. Those pieces which they call moving pictures, where the painted landscape remains immovable, and the figures move by means of springs, form a part of these decorations; and there are some of them, as those of Antwerp and Ghent, that have a pleasing effect.

47. The designs for *furniture, carriages, porcelain*, and other branches of manufacture, form also a very important article of painting in general, and of academy painting in particular. This is a distinct branch of the art; and without doubt not the least useful of its parts, as it concurs so essentially to the success of manufactures, and consequently to the prosperity of a

state: and it is an art, to which it were much to be wished that youth of ability and invention would apply themselves. See the articles *JAPANNING* and *PORCELAIN*. Materials,
&c.

SECT. V. *Enumeration of the different Methods of Painting, or the different Means and Materials that painters make use of to imitate all visible objects on a plane superficies.*

48. Those now in practice are,

1. *Painting in oil*; which is preferable to all other methods, as it is more susceptible of all sorts of expressions, of more perfect gradations of colours, and is at the same time more durable.

2. *MOSAIC painting*; an invention truly wonderful; it is composed of a great number of small pieces of marble of different colours, joined together with stucco. The works of this kind are made principally at Rome, where this art has been carried so far as to resemble the paintings of the greatest masters; and of these are made monuments for the latest posterity.

Paintings in FRESCO; which is by drawing, with colours diluted with water, on a wall newly plastered, and with which they to incorporate, that they perish only with the stucco itself. This is principally used on ceilings.

4. *Painting in WATER-COLOURS*; that is, with colours mixed with water and gum, or paste, &c.

5. *MINIATURE painting*; which differs from the preceding only as it represents objects in the least discernible magnitudes; and is consequently vastly more delicate, seeing it is performed by the smallest strokes possible; whereas the others have the full scope of the pencil.

6. *Painting in CRAYONS*; for which purpose colours, either simple or compound, are mixed with gum, and made into a kind of hard paste like chalk, and with which they draw on paper or parchment.

7. *Painting in ENAMEL*; which is done on copper or gold, with mineral colours that are dried by fire, and become very durable. The paintings on the *PORCELAIN* of China and Europe, on Delph ware, &c. are so many sorts of enamel.

8. *Painting in WAX, or ENCAUSTIC painting*: This is a new invention, and in which there are in France performances highly pleasing. It is done with wax-mixed with varnish and colours.

9. *Painting on GLASS*; of which there are various kinds.

See all the articles here enumerated, explained in the order of the alphabet.

P A I

PAIR; two of a sort, a couple.

PAIRING, the uniting or joining in couples.

The instinct of pairing is bestowed on every species of animals to which it is necessary for rearing their young; and on no other species. All wild birds pair; but with a remarkable difference between such as place their nests on trees, and such as place them on the ground. The young of the former, being hatched blind, and without feathers, require the nursing care of both parents till they be able to fly. The male feeds his mate on the nest, and cheers her with a song.

P A I

As soon as the young are hatched, singing yields to a more necessary occupation, that of providing food for a numerous issue; a task that requires both parents.

Eagles and other birds of prey build on trees, or on other inaccessible spots. They not only pair, but continue in pairs all the year round; and the same pair procreates year after year. This at least is the case of eagles: the male and female hunt together, unless during incubation, during which time the female is fed by the male. A greater number than a single pair are never seen in company.

Gre-

Pairing. Gregarious birds pair, in order probably to prevent discord in a society confined to a narrow space. This is the case particularly of pigeons and rooks. The male and female sit on the eggs alternately, and divide the care of feeding their young. **Pairing.** males abandon their flock of food to their mate, and live at large; but return frequently to visit them while they are suckling their young.

Komer's
Sketches,
vol. i.
p. 198.

Partridges, plovers, pheasants, sea-fowl, grouse, and other kinds that place their nests on the ground, have the instinct of pairing; but differ from such as build on trees in the following particular, that after the female is impregnated, she completes her task without needing any help from the male. Retiring from him, she chooses a safe spot for her nest, where she can find plenty of worms and grubs-feed at hand; and her young, as soon as hatched, take foot, and seek food for themselves. The only remaining duty incumbent on the dam is, to lead them to proper places for food, and to call them together when danger impends. Some males, provoked at the desertion of their mates, break the eggs if they stumble on them. Eider ducks pair like other birds that place their nests on the ground; and the female finishes her nest with down plucked from her own breast. If the nest be destroyed for the down, which is remarkably warm and elastic, she makes another nest as before. If she is robbed a second time, she makes a third nest; but the male furnishes the down. A lady of spirit observed, that the eider duck may give a lesson to many a married woman, who is more disposed to pluck her husband than herself. The black game never pair: in spring, the cock on an eminence crows, and claps his wings; and all the females within hearing instantly resort to him.

Pairing birds, excepting those of prey, flock together in February, in order to choose their mates. They soon disperse; and are not seen afterward but in pairs.

Pairing is unknown to quadrupeds that feed on grubs. To such it would be useless; as the female gives suck to her young while she herself is feeding. If M. Buffon deserves credit, the roe-deer are an exception. They pair, though they feed on grubs, and have but one litter in a year.

Beasts of prey, such as lions, tigers, wolves, pair not. The female is left to shift for herself and for her young; which is a laborious task, and often so unsuccessful as to shorten the life of many of them. Pairing is essential to birds of prey, because incubation leaves the female no sufficient time to hunt for food. Pairing is not necessary to beasts of prey, because their young can bear a long fast. Add another reason, that they would multiply so fast by pairing, as to prove troublesome neighbours to the human race.

Among animals that pair not, males fight desperately about a female. Such a battle among horned cattle is finely described by Lucretius. Nor is it unusual for seven or eight lions to wage bloody war for a single female.

The same reason that makes pairing necessary for gregarious birds, obtains with respect to gregarious quadrupeds; those especially who store up food for winter, and during that season live in common. Discord among such would be attended with worse consequences than even among lions and bulls, who are not confined to one place. The beavers, with respect to pairing, resemble birds that place their nests on the ground. As soon as the young are produced, the

Hedgehogs pair as well as several of the monkey-kind. We are not well acquainted with the natural history of these animals; but it would appear that the young require the nursing care of both parents.

Seals have a singular economy. Polygamy seems to be a law of nature among them, as a male associates with several females. The sea-turtle has no occasion to pair, as the female concludes her task by laying her eggs in the sand. The young are hatched by the sun, and immediately crawl to the sea.

PAISLEY, a town of Renfrewshire, in Scotland, situated about six miles west of Glasgow, on the river White-Cart, over which there are two stone-bridges of two arches each, and one which consists of three arches. The town is very ancient; but was of much less consequence formerly than it is at present. The old part of it runs from east to west upon the south slope of a ridge of hills, from which there is a fine prospect of the city of Glasgow and the adjacent country; but to the southward, the view terminates in a ridge of green hills, about two miles distant. Including the late buildings and suburbs, it is fully a mile long, and nearly as much in breadth. On the east side of the river Cart, stand the abbey and new town; which last was lately severed off by the Earl of Abercorn, and already consists of a number of handsome buildings. The streets are here laid off in a regular manner, but (rather unfortunately for the convenience and elegance of some of the houses) not in right angles. Here the Earl of Abercorn has built, at his own expense, one of the largest, most commodious, and most elegant inns in Scotland. In the vicinity of this his Lordship is likewise to build several convenient and necessary market-places. A little way south of the inn stands the abbey-church, the only one which Paisley, before the year 1735, required. This church, when entire, has been a most noble building, and consisted of several distinct and separate places of worship: what now remains of this magnificent Gothic structure is not yet unworthy the notice of the curious in antiquities. The next church, called the *Laigh-Church*, is built in form of a Greek cross, very well laid out, and capable of containing a great number of people. The one called the *High-Church*, is a very fine building; and as it stands on the top of a hill, its lofty spire is visible at a great distance. This church is an oblong square of 82 feet by 62 within the walls, built of free-stone well smoothed, having rustic corners and an elegant stone cornice at the top. In the construction of the roof (which is a pavilion covered with slate, having a platform covered with lead on the top), there is something very curious, and it is admired by every person of taste. The Middle or New Church is a very neat building, on much the same model with the High Church, but not quite so large. Besides these, there are also two Seceding Meeting-houses and a Church of Relief. The town-house is a very handsome building of cut stone, with a tall spire and a clock. The fish-market has a genteel front of cut stone, and is one of the neatest and most commodious of this kind in Britain. Butchers-meat, butter, cheese, fish, wool, and several other articles, are sold here by what they call the

Paisley. tron-pound, of 22 English ounces and an half.

The poor-house is a large building, very well laid out; and stands opposite to the quay, in a fine free air. It is supported by a small tax laid upon the inhabitants quarterly.

Close by the Abbey-Church is the Earl of Abercorn's burial-place, the greatest curiosity in Paisley. It is a vaulted Gothic chapel, without pulpit, pew, or any other ornament, but has the finest *echo* perhaps in the world. When the end door (the only one it has) is shut, the noise is equal to a loud and not very distant clap of thunder. If you strike a single note of music, you hear the sound gradually ascending, with a great number of repetitions, till it dies away as if at an immense distance, and all the while diffusing itself through the circumambient air. If a good voice sings, or a musical instrument is well played upon, the effect is inexpressibly agreeable. The *deepest*, as well as the most *acute tones*, are distinctly reverberated, and these in regular intervals of time. When a musical instrument is sounded, it has the effect of a number of instruments of a like size and kind playing in concert. When a number of different instruments in unison sounds the same note, a good ear is able to distinguish the variety of sound produced by each. A single instrument sounding a particular note, and then instantly its fifth, or any other concordant note, the two sounds can be heard, as it were, running into and uniting with each other in a manner peculiarly agreeable. But the effect of a variety of instruments playing in concert, is particularly charming, and must excite such emotions in the soul as it is impossible to describe. In this chapel is the monument of Marjory Bruce; she was daughter of Robert Bruce, and wife of Walter, great steward of Scotland, and mother of Robert II. In this same chapel were interred *Elizabeth Muir* and *Euphemia Ross*, both consorts to Robert II. In 1160, a fine monastery was founded by Walter, great steward of Scotland; but of this there are scarce any vestiges now remaining. The vestiges of the Roman camp and *prætorium*, at the west end of the town, are at present almost annihilated. It was supposed to be vaulted underneath.

The inhabitants of Paisley, in 1746, were computed at no more than 4000: but from a very accurate survey which has just been made, the number of families in Paisley and suburbs is found to be 3723; and allowing $\frac{4}{3}$ persons to each family, the number of inhabitants will be 16,753.

Paisley is now the first manufacturing town in Scotland, and is greatly celebrated on account of some of its branches. The manufactory of silk gauze, in this respect, first claims our notice. This branch is brought here to the utmost perfection, and is wrought to an amazing variety of patterns. It has been just computed, that there have been no less than 5000 weavers employed in Paisley and in the country adjacent, in this branch, last year (1781); and the number of winders, warpers, clippers, and others necessary in other parts of the silk-manufacture, has been likewise computed to be no less than 5000. Each loom will produce in average value 70*l.* yearly; the whole will then be 350,000 *l.*

The linen branch is likewise carried on here to a very considerable amount, particularly the manufac-

ture of lawns; and vast quantities of foreign yarn are annually imported from France, Germany, &c. for this branch, besides what is made of our home-manufactured yarn. It appears from the stamp-master's books, that from 1st November 1780 to 1st November 1781, there were stamped at Paisley no less than 1,248,843 yards, value 105,930 *l.* 19 *s.* 10½. The making of white flitching thread was introduced into this town about 50 or 60 years ago. A gentleman in this place lately discovered the method of making what is called *glazed white-thread*, to as great perfection as that made by Mr Leland and Son, London. The value of this branch is computed at about 60,000 *l.* annually. There are also several manufactures of a more local nature. There are three of hard-soap and tallow-candles, and one of black-soap. The candles, especially the moulded ones, are reckoned the best and most elegant that have been made in Scotland; and great quantities is sent into England, to America, and to the West Indies. The annual amount of these last branches are estimated at nearly 20,000 *l.* There are also two or three tan-works, and a porter brewery, in town; and in the neighbourhood there is a copras work, a calli-con printing work, and two works for the cotton spinning manufactory.

The river on which Paisley stands runs from south to north; and falls into Clyde, after it has joined the conflux of the rivers Grief and Black-Cart at Inchinnan bridge, about three miles below the town. At spring-tides, vessels of 40 tons burthen come up to the quay. The communication by water is of great importance to the inhabitants: for in this way they are frequently served with fish of different kinds, and can send their goods and manufactures to Port-Glasgow and Greenock, and to Glasgow likewise; and now, when the canal is finished, they have also a communication with the frith of Forth.

Paisley was created a burgh of barony in the year 1488; and the affairs of the community are managed by three bailies, of which the eldest is commonly in the commission of the peace, a treasurer, a town-clerk, and 17 counsellors, who are annually elected upon the first Monday after Michaelmas. It gives the title of baron to the earls of Abercorn; the first of whom was a younger son of the Duc de Chatellerault. The *black-book of Paisley*, frequently mentioned in Scottish history, was a chronicle of the public affairs and remarkable events, kept by the monks who resided in the monastery already mentioned. It agreed in every material fact with the *Scoti-chronicon* of Fordun; and is by many thought to be the same performance.

PAITA, a sea-port of America, in Peru, and in the audience of Quito. The town consists of about 200 houses but one story high; and the walls are made of split cane and mud, and the roofs only a covering of leaves. The only defence of Paita is a fort without either ditch or out-work; but it is surrounded by a brick wall of little or no strength, on which are mounted eight pieces of cannon. Commodore Anson got possession of this fort in 1741; and took and burnt the town, because the governor refused to ransom it. W. Long. 80. 5. S. Lat. 5. 5.

PALACE, PALATIUM, a name generally given to the dwelling-houses of kings, princes, and other great personages; and taking different epithets, according to the

Paisley
Palace.

Palace the quality of the inhabitants, as *imperial palace, royal palace, pontifical palace, cardinal palace, ducal palace, episcopal palace, &c.*

Palate.

PALACE-Court. See MARSHALSEA.

PALÆMON, or **MELICERTES**, in fabulous history, a marine god, was the son of Athamas, king of Thebes and Ino. The latter, fearing the rage of the king her husband, took Melicertes in her arms, and leaped with him into the sea, when they were both changed into marine deities; the mother under the name *Leucothea*, supposed by some to be the same with Aurora; and her son under that of *Palemon*, or *Portunus*, a god who presided over sea-ports. Pausanias says, that Melicertes was saved on the back of a dolphin, and his dead body thrown on the isthmus of Corinth, where Sisyphus, his uncle, who reigned in that city, instituted to his honour the Isthmian games.

PALÆMON (Q. Rhemmius), a Latin grammarian, born at Vicenza, was the son of a slave. He taught at Rome with great applause under Tiberius and Claudius, and Juvenal mentions him with praises. We have only two fragments of his works.

PALEPAPHOS, (Strabo, Virgil, Pliny), a town of Cyprus, where stood a temple of Venus; and an adjoining town called *Nea Paphos*; where St Paul struck Elymas blind, and converted the proconsul Sergius Paulus.

PALESTRA, in Grecian antiquity, a public building, where the youth exercised themselves in wrestling, running, playing at quoits, &c.

PALESTROPHYLAX, was the director of the palestra, and the exercises performed there.

PALAMEDIA, in ornithology, a genus belonging to the order of gallæ. The bill is conical, the superior mandible being crooked; and the feet have three divided toes. There are two species, both natives of Brazil.

PALARIA, among the Romans, a kind of exercise performed at a stake by the soldiers. The stake being fixed in the ground, and six feet high above it, the young undisciplined soldiers advanced against it, armed with a hurdle and cudgel, instead of a sword and shield, and went through all the rules of attack and defence, as if actually engaged with an adversary. Sometimes they stood at a distance, and attacked with missile weapons; at the same time using all the requisite motions for defending themselves, and warding off what might be thrown against them.

PALATE, in anatomy, the flesh that composes the roof, or the upper and inner part, of the mouth.

The palate has much the same structure with the gums; but it has also a great number of glands, discovered so early as the time of Fallopius: these are principally situated in the hinder part near the uvula, where it is pendulous, in the manner of a curtain, which part is called the *velum*, or *claustrum*, of the palate. The glands situated particularly in this part, secrete a mucous fluid, serving to lubricate the mouth and throat, and to facilitate deglutition: they have a great number of apertures there for the discharge of this humour into the mouth.

The great uses of this membrane are to defend the bones of the palate from corrupting; and for preventing, by its claustrum or velum, the things to be swallowed from getting up into the nostrils.

PALATINATE, a province or signiory, possessed by a palatine.

PALATINATE of the Rhine, a province of Germany, divided into two parts by the Rhine, called the *Upper* and *Lower Palatinate*. The former lies in the circle of Bavaria, and belongs to the elector thereof; but the latter, in the circle we are now treating, belongs to the elector Palatine. The latter part is bounded to the east by the county of Katzenellenbogen, the archbishopric of Mentz, the bishopric of Worms, and part of the territory of the Tuetonic order in Franconia; to the west, by Alsace, the duchy of Deuxponts, the county of Sponheim, the duchy of Simmern, and certain districts of the electorate of Mentz; to the south, by the duchy of Wurtemberg and the bishopric of Spire; and to the north, by a part of archbishopric of Mentz and the county of Katzenellenbogen. It contains 41 towns, besides several boroughs; and its greatest extent is about 80 miles. The air is healthful, and the soil fruitful in corn, pasturage, wine, tobacco, and all sorts of pulse and fruits, particularly walnuts, chestnuts, and almonds. This country also breeds abundance of cattle, and is well watered by the Neckar, the Nahe, and the Rhine. In the last of these, near Germerheim and Selz, is found gold; the exclusive right of searching for which is farmed out by the elector. The state of religion hath varied greatly here since the Reformation, Lutheranism and Calvinism having been uppermost by turns, till the electorate devolved to the Popish branches of the family, when Popery, with all its superstition and mummery, was established anew; so that the Protestant religion is now on a very precarious footing in the Palatinate, though most of the natives are still of that persuasion: but the two sects of Protestants, namely, the Lutherans and Calvinists, have greatly contributed to their own ruin, by their mutual jealousy and animosity, being no less rancorous against one another than against their common adversaries the Papists. The Lutherans reckon themselves 50,000 strong, and are possessed of about 85 churches; but not one half of their preachers and schoolmasters have a competent maintenance. The number of Calvinist clergy here is estimated at 500, and that of the Roman Catholics at 400. Besides schools and Jesuits colleges in this country, there is one university, namely, that of Heidelberg; but there is very little trade in it except in wine. Authors are divided about the origin of the name *Palatines*, or *Palzgraves*, as the Germans call them; but it seems most likely to be derived from the *palatia*, or palaces, which the old Frankish and German kings and Roman emperors were possessed of in different parts of the country, and over which they appointed supreme stewards or judges, who were called *Palatines* or *Palzgraves*. The countries where these Palatines kept their courts were, from them, called *Palatinates*; which name came at last to be appropriated, by way of eminence, to this country, as being the most considerable of them. The ancient electoral line failing in 1685, the electorate devolved to Philip-William Duke of Neuburg; and upon the death of his second son Charles-Philip, to the prince of Sulzbach. This elector has the title of arch-treasurer of the empire, as well as the elector of Brunswick-Luneburgh, and is the fifth in rank among the secular electors. He is

Palatine: also one of the vicars of the empire alternately with the elector of Bavaria, and enjoys many other prerogatives. In his own dominions, he disposes of all vacant benefices; but allows the ecclesiastical council, composed of two clergymen and two laymen, to present two candidates, of which he chooses one. He is also master of all the tithes in his dominions; but he either grants them to the clergy, or salaries in lieu of them, out of the revenues of the church. His title is Palgrave of the Rhine; archtreasurer and elector of the holy Roman empire; duke in Bavaria, Juliers, Cleve, and Berg; prince of Mors; marquis of Bergen-op-Zoom; count of Veldeus, Sponheim, the Mark, and Ravensberg; and lord of Ravenstein. His quota to the army of the empire is 30 horse, and 138 foot, or 914 florins monthly. To the chamber of Wetzlar he contributes, each term, 404 rix-dollars, 82 kruit-zers. There is an order of knighthood in this country, viz. that of St Hubert; the badge of which is a quadrangular cross pendant to a red ribbon, with a star on the breast. The whole of the elector's revenue, arising from the Palatinate, the duchies of Berg and Juliers, the feignory of Ravenstein, and the duchies of Neuburg and Sultzbach, hath been estimated at about 300,000 l. per annum. The military establishment consists of several regiments of horse and foot, besides the horse and Swiss life-guards. All the different courts and councils, usual in other countries for the different departments of government, are also to be found here.

PALATINE, or **COUNT PALATINE**, a title anciently given to all persons who had any office or employment in the prince's palace; but afterwards conferred on those delegated by princes to hold courts of justice in the provinces; and on such among the Lords as had a palace, that is, a court of justice, in their own houses.

Counties-PALATINE in England.—Chester, Durham, and Lancaster, are called *counties palatine*. The two former are such by prescription, or immemorial custom; or, at least as old as the Norman conquest: the latter was created by king Edward III. in favour of Henry Plantagenet, first earl and then duke of Lancaster; whose heirs being married to John of Gaunt the king's son, the franchise was greatly greatly enlarged and confirmed in parliament, to honour John of Gaunt himself, whom, on the death of his father-in-law, the king had also created duke of Lancaster. Counties-palatine are so called *à palatio*; because the owners thereof, the earl of Chester, the bishop of Durham, and the duke of Lancaster, had in those counties *jura regalia*, as fully as the king hath in his palace; *regalem potestatem in omnibus*, as Bracton expresses it. They might pardon treasons, murders, and felonies; they appointed all judges and justices of the peace; all writs and indictments ran in their names, as in other counties in the king's; and all offences were said to be done against their peace, and not, as in other places, *contra pacem domini regis*. And indeed by the ancient law, in all peculiar jurisdictions, offences were said to be done against his peace in whose court they were tried; in a court-leet, *contra pacem domini*; in the court of a corporation, *contra pacem ballivorum*; in the sheriff's court or tourn, *contra pacem vicecomitis*. These palatine privileges (so similar to the

regal independent jurisdictions usurped by the great barons on the continent during the weak and infant state of the first feudal kingdoms in Europe), were in all probability originally granted to the counties of Chester and Durham, because they bordered upon enemies countries, Wales and Scotland: in order that the owners, being encouraged by so large an authority, might be the more watchful in its defence; and that the inhabitants, having justice administered at home, might not be obliged to go out of the county, and leave it open to the enemy's incursions. And upon this account also there were formerly two other counties palatine, Pembrokeshire and Hexhamshire, the latter now united with Northumberland: but these were abolished by parliament, the former in 27 Hen. VIII. the latter in 14 Eliz. And in 27 Hen. VIII. likewise, the powers before mentioned of owners of counties-palatine were abridged; the reason for their continuance in a manner ceasing: though still all writs are witnessed in their names, and all forfeitures for treason by the common law accrue to them.

Of these three, the county of Durham is now the only one remaining in the hands of a subject. For the earldom of Chester, as Camden testifies, was united to the crown by Hen. III. and has ever since given title to the king's eldest son. And the county palatine, or duchy, of Lancaster was the property of Henry of Bolingbroke, the son of John of Gaunt, at the time when he wrested the crown from king Richard II. and assumed the title of Hen. IV. But he was too prudent to suffer this to be united to the crown; lest, if he lost one, he should lose the other also. For, as Plowden and Sir Edward Coke observe, "he knew he had the duchy of Lancaster by sure and indefeasible title, but that his title to the crown was not so assured: for that after the decease of Richard II. the right of the crown was in the heir of Lionel duke of Clarence, second son of Edward III.; John of Gaunt, father to this Henry IV. being but the fourth son." And therefore he procured an act of parliament, in the first year of his reign, ordaining that the duchy of Lancaster, and all other his hereditary estates, with all their royalties and franchises, should remain to him and his heirs for ever; and should remain, descend, be administered, and governed, in like manner as if he never had attained the regal dignity: and thus they descended to his son and grandson, Henry V. and Henry VI.; many new territories and privileges being annexed to the duchy by the former. Henry VI. being attainted in 1 Edward IV. this duchy was declared in parliament to have become forfeited to the crown, and at the same time an act was made to incorporate the duchy of Lancaster, to continue the county palatine (which might otherwise have determined by the attainder), and to make the same parcel of the duchy: and, farther, to vest the whole in king Edward IV. and his heirs, kings of England, for ever; but under a separate guiding and governance from the other inheritances of the crown. And in 1 Hen. VII. another act was made, to refuse such part of the duchy lands as had been dismembered from it in the reign of Edward IV. and to vest the inheritance of the whole in the king and his heirs for ever, as amply and largely, and in like manner, form, and condition, separate from the crown of Eng-
land

Palatine
||
Palætrius.

land and possession of the fame, as the three Henries and Edward IV. or any of them, had and held the fame.

The ifle of Ely is not a county-palatine, though fometimes erroneoufly called fo, but only a royal franchife: the bifhop having, by grant of king Henry the firft, *jura regalia* within the ifle of Ely; whereby he exercifes a jurifdiction over all caufes, as well criminal as civil.

PALATINE Games, in Roman antiquity, games inftituted in honour of Auguftus by his wife Livia, after he had been enrolled among the gods. They were celebrated in the palace, and were confirmed by the fucceeding emperors.

PALATINUS MONS, or *Palatium*, the firft mountain of Rome occupied by Romulus, and where he fixed his refidence and kept his court, as did Tullus Hoftilius, Auguftus, and all the fucceeding emperors: and hence it is that the refidence of princes is called *palatium*. The reason of the name is variously assigned. To the east it has the Mons Cælius, to the fouth the Aventine, to the weft the Capitoline, and to the north the Forum.—*Palatinus*, the furname of Apollo from this place; where Auguftus built a temple to that god, adorned with porticos and a library, (Horace).

PALATIUM, (anc. geog.) a place in the territory of Reate, diftant from it 25 Itadia. Dionyfius Halicarnaffus reckons it one of the firft towns of the Aborigines, and from it Varro accounts for the name of the *Mons Palatinus*; namely, that a colony from Palatium fettled there.

PALATIUM (Pliny), *Pallantium* (Paufanias), *Palanteum* (Livy); *Pallanteum* (Solinus). This laft is the true writing; the great grandfather of Evander, from whom it took its name, being called *Pallas*, not *Palas*: A town of Arcadia, which concurred to form Megalopolis (Paufanias). From it the *Palatium*, or *Mons Palatinus*, takes alfo its name, according to Virgil and Pliny.

PALATIUM Dioclefiani; the villa of Dioclefian, near Salonæ, where he died, (Eufebius). Afterwards called *Spalatum*; which rofe to a confiderable city from the ruins of Salonæ; fittuate in Dalmatia on the Adriatic. Now *Spalatto*, or *Spalatro*.

PALATIUM Luculli, (Plutarch), or *Villa Luculli*; a place between Mifenum and Baiæ in Campania, of wonderful ftructure. Now in ruins, and called *Pifcina Mirabile*.

PALATO-SALPINGÆUS, } See *ANATOMY*, *Table*
PALATO-Staphylinus, } *of the Mufcles*.

PALE, a little pointed flake or piece of wood ufed in making inclofures, feparations, &c. The *pale* was an inftrument of punifhment and execution among the ancient Romans, and ftill continues fo among the Turks. Hence empaling, the paffing a fharp pale up the fundament through the body.

PALE, in heraldry. See *HERALDRY*, p. 4839.

PALEARIUS (Aonius), was a man of the great eft probity, and one of the beft writers of the 16th century. He gained the efteem of the men of wit and learning of his time by a noble poem on the immortality of the foul. He was appointed profeffor of poe literature at Sienna; where his tranquillity was difturbed by contefts with an envious colleague, and by

the malicious afperfions of his enemies; againft which, however, his eloquence proved always a fufficient defence. At laft he left Sienna, and accepted the invitation of the magiftrates of Lucca, who gave him feveral marks of their efteem, and fettled a confiderable ftipend upon him. Some years after, he removed to Milan; where he was feized by order of Pope Pius V. and carried to Rome. He was convicted of having fpoken in favour of the Luthcrans, and againft the inquifition; and therefore was condemned to be burnt. This fentence was executed in 1566. He wrote feveral pieces in verfe and profe; of which the one above-mentioned is the moft efteemed.

PALENCIA, a town of Spain, in the kingdom of Leon, with a rich archbifhop's fee. It had an univerfity, but it was removed to Salamanca. It is feated in a fertile foil on the river Carion on the frontiers of Caftile, in W. Long. 3. 7. N. Lat. 42. 10.

PALERMO, an ancient, large, populous, rich, and handfome city of Sicily in the Val-di-mazara, with an archbifhop's fee and a harbour. It was the feat of the ancient kings, and is four miles in circumference. It is a place of great trade; the houfes are handfome and fuperb; it is alfo well fortified, and very populous. The public buildings, fquares, churches, and fountains, are extremely fine. The fountain in the great fquare is thought to be the fineft in all Italy. The number of the inhabitants is above 200,000; and the harbour is very large, having a mole 1300 geometrical paces in length; but the veffels that ride therein are not always very fafe. There is a magnificent caftle built near the fea-fide, wherein the viceroy refides fix months in the year; and his prefence draws a great number of nobility to this place. This city has fuffered greatly by earthquakes, particularly in 1693; and it was greatly damaged by a fire in 1730, when a magazine of powder was blown up, containing 400 tons. It ftands in a pleafant fruitful country on the north-eaft coaft of the ifland, and at the bottom of the gulph of the fame name. E. Lon. 33. 40. N. Lat. 38. 10.

PALES, in Pagan worfhip, the goddefs of the fhepherds; to whom they offered milk and honey, in order that the might deliver them and their flocks from wild beafts and infectious difeafes. This goddefs is reprefented as an old woman.

PALESTINE, a part of Afiaic Turkey, fituated between 36 and 38 degrees of E. Long. and between 31 and 34 of N. Lat. It is bounded by Mount Libanus, which divides it from Syria, on the north; by Mount Hermon, which feparates it from Arabia Deferta, on the eaft; by the mountains of Seir and the defarts of Arabia Petræa, on the fouth; and by the Mediterranean Sea on the weft.

This once fertile and happy fpot was firft called the land of *Canaan*, or *Chanaan*, from Noah's grandfon. In fcripture, however, it is frequently diftinguifhed by other names; fuch as the *land of promife*, the *land of God*, the *land of Ifrael*, &c. It received the name of *Paleftine* from the *Phælistines*, or *Philiftines*, who poffeffed a great part of it; and it had the name of *Judea*, or *Judea-Paleftina*, from *Judah*, the moft confiderable of the twelve fons of Jacob. The Chriftians have denominated it the *Holy Land*; partly on account of the many fingular bleffings it received from the divine

Palengia
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Palestine. vine providence, and partly on account of its metropolis being made the centre of God's worship and his peculiar habitation; but much more for its being the place of our Saviour's birth, the scene of his preaching, and manifold miracles; especially the place in which he accomplished the great work of our redemption. As to the name of *Judea*, it did not begin to receive that till after the return of the Jews from the Babylonish captivity, though it had been styled long before the *kingdom of Judah*, in opposition to that of *Israel*, which revolted from it under Jeroboam, in the reign of Rehoboam the son of Solomon. But after the return, the tribe of Judah, the only one that made any figure, settling at Jerusalem, and in the countries adjacent, quickly gave its name to the whole territory. By profane authors it was called by many different names; such as Syria, Palestina Syria, Cæsaryia, Iduma, Idumæa, and Phœnicia or Phœnice; but these are supposed only to have been given out of contempt to the Jewish nation, whom they looked upon as unworthy of any other name than what distinguished the most obscure parts of the neighbouring provinces.

That part of the country which was properly called the *Land of Promise*, was inclosed on the west by the Mediterranean; on the east by the lake Asphaltites, the Jordan, and the sea of Tiberias or of Galilee, and the Samachonite lake; to the north it had the mountains of Libanus, or rather of Antilibanus, or the province of Phœnicia; and to the south, that of Edom or Idumæa, from which it was likewise parted by another ridge of high mountains. The boundaries of the other part, which belonged to the two tribes and an half beyond the river Jordan, are not so easily defined, as well as those of the conquests made by the more prosperous kings of the Jews. All that can be said with any probability is, that the river Arnon was the first northern boundary on that side; and with respect to those on this side the Jordan, there is a considerable disagreement between the Hebrew and Samaritan versions of the Pentateuch.

The extent of this country is likewise variously settled by geographers; some giving it no more than 170 or 180 miles from north to south, and 140 in breadth where broadest, though not much above half that breadth where narrowest. But from the latest and most accurate maps, it appears to extend near 200 miles in length, and about 80 in breadth about the middle, and about 10 or 15 more or less, where it widens or shrinks. It reaches from 31. 30. to 33. 30. N. Lat. and from 34. 50. to 37. 15. E. Long. the longest day being about 14 hours 15 minutes.

These limits are so small, considering that the country is likewise intersected by high ridges or mountains, woods, deserts, &c. that many learned men have been induced to question what we read of its fertility and populousness in former times. It must be owned, indeed, that when we compare its ancient and flourishing state, when it was cultivated with the utmost diligence by persons well skilled in every branch of agriculture, with what it hath been since the total extirpation of the Jews out of it, and more especially since it fell into the hands of the Turks, the contrast is amazingly great: but when we consider the many evident causes which have contributed to effect this change, and even yet consider the nature of the country itself, we find not

the least reason to doubt the truth of what the sacred *Palestine* historians have related. Moses describes the richness of it in the strongest terms, even before the Israelites got possession of it. It even exceeded the land of Egypt, so much celebrated by ancient historians; especially in the vast numbers of cattle which it produced; in the quantity and excellence of its wine, oil, and fruits. With respect to the oil and fruits, it is plain, that the olives and oil of Canaan exceeded in goodness those of Egypt, since the tribes sent them thither from thence; and as for wines, Herodotus tells us, that the Egyptians had none at all, but supplied the want of them by a liquor brewed from barley. The presents which Jacob sent to his son Joseph, of honey, spices, myrrh, almonds, and other fruits of Palestine, show that they must have been much better in the land of Judea than in Egypt. The wines of Gaza, Ascalon, and Sarepta, were famous among the most remote nations; though it is allowed, that the wine which was made at and in the neighbourhood of Bethlehem, in great quantities, was equal at least, if not superior, to any of the rest: and that of Libanus, mentioned by the prophet Hosea, was no less celebrated for its excellent flavour.

Several circumstances contributed to this wonderful fecundity: such as, the excellent temperature of the air, which was never subject to excessive heats or colds; the regularity of its seasons, especially the former and latter rain; and the natural fatness and fertility of its soil, which required neither dung nor manuring, and could be ploughed with a single yoke of oxen and a small kind of plough; for the soil was, and is still, so shallow, that to have gone deep into it, would rather endanger, than improve, the crop. With respect to the excellency of its corn, we are told, that the bread of Jerusalem was preferred above all other; and the tribe of Asher produced the best of both, and in greater quantity than any other tribe: and such plenty was there of it, that, besides what sufficed the inhabitants, who made it their chief sustenance, Solomon, we read, could afford to send 20,000 cors, or measures, of it, and as many of oil, yearly, to Hiram king of Tyre; besides what they exported into other countries. And we find, even so late as king Herod surnamed Agrippa, the countries of Tyre and Sidon received most of their sustenance from his tetrarchy.

As to their fruits, the grapes were delicious, finely flavoured, and very large. The palm tree and its dates were in no less request; and the plain of Jericho, among other places, was famed for the great plenty and excellence of that fruit; inasmuch, that the metropolis of that territory was emphatically styled *the city of palm-trees*. But what both this plain, and other parts of Palestine, were most celebrated for, was, the balsam shrub, whose balm was esteemed so precious a drug among the Greeks, Romans, Egyptians, and other nations, and is still to this day under the name of *balm of Gilead*. They had likewise the greatest variety of other fruit-trees in the highest perfection; and which might be, in some sense, styled *perpetual*, because they were not only covered with a constant verdure, but because the new buds always appeared on the same boughs before the old fruit was ripe; and of those buds, which were

Palestine. in too great quantities to be allowed to come to maturity, they gathered enough to make very delightful pickles and sweatmeats, especially of their citrons, oranges, and apples of paradise, which last commonly hung by hundreds in a cluster, and as big as hens eggs, and of an excellent taste and flavour. Their vines yielded grapes twice, and sometimes three times, a-year, great quantities of which were dried up, and preserved for use, as well as their figs, plums, and other fruits. They had plenty of honey; the very trees distilled it; and the rocks yielded it in great quantities: but whether that of the latter kind were there deposited by the industrious bees, or produced some other way, is much disputed by travellers and naturalists. They likewise cultivated sugar-canes in great abundance; and the cotton, hemp, and flax, were mostly of their own growth and manufacture, except some of a finer sort, that were brought to them from Egypt, and worn by those of the higher rank. Their vicinity to Libanus made the cedars, cypresses, and other stately fragrant trees, very common in most parts of the land, but more especially in Jerusalem. Cattle, both large and small, they fed in vast quantities; and the hilly countries not only afforded them variety and plenty of pasture, but also of water, which descended thence into the valleys and lowlands, and fertilized them to the degree we have seen; besides several other rivers and brooks, some of the most remarkable of which we shall speak of in their proper places. But the most fertile pasture-grounds were those on each side the river Jordan; besides those of Sharon, or Sarona, the plains of Lydda, Jamnia, and some others then justly famed for their fecundity. As for fish, the rivers above-mentioned, the lake of Tiberias, and the Mediterranean Sea, afforded, as they do to this day, great plenty and variety. Vast quantities were brought to Jerusalem, on which the inhabitants mostly subsisted; and hence one of the gates of that metropolis was, according to St Jerome, called *the fish-gate*. The lake Asphaltites yielded salt in abundance, wherewith to season and preserve their fish, which Galen affirms to have been preferable to any other for wholesomefness, digestion, and extenuation. In short, the Scripture is so pregnant with proofs of the extraordinary richness and fecundity of this once happy land, and the vast number of people that lived in it, almost wholly upon its product, to say nothing of the vast exports of its corn, wine, oil, raisins, and other fruits, &c. that a man must have taken a strange warp to infidelity, that can call it in question, merely on account of the melancholy and quite opposite figure it now makes under its present tyrannical government.

But it ought to be considered, that it was then inhabited by an industrious people, who knew how to improve every inch of their land, and had made even the most desert and barren places to yield some kind of productions, by proper care and manure: so that the very rocks, which now appear quite bare and naked, were made to produce corn, pulse, or pasture; being, by the industry of the old inhabitants, covered with mould, which, through the laziness of the succeeding proprietors, has been since washed off with rains and storms. We may add, that the kings themselves were not above encouraging all kind of agriculture, both by precept and example; and, above all,

that they had the divine blessing promised to their honest endeavours and industry: whereas it is now, and hath been long since, inhabited by a poor, lazy, indolent people, groaning under an intolerable servitude and all manner of discouragements; by which their aversion to labour and agriculture, farther than what barely serves to supply their present wants, is become, in a manner, natural and invincible. We may farther observe, after the judicious Mr Maundrell, that there is no forming an idea of its ancient flourishing state, when under the influence of heaven, from what it is now under a visible curse. And, if we had not several concurring testimonies from profane authors, who have extolled the fecundity of Palestine, that single one of Julian the apostate, a sworn enemy to Jews and Christians, as well as to all the sacred writings, would be more than sufficient to prove it; who frequently makes mention, in his epistles, of the perpetuity, as well as excellence and great abundance, of its fruits and product. The visible effects of God's anger, which this country has felt, not only under Titus Vespasian (when myriads of inhabitants were either slain, or perished by the most severe famine, pestilence, and other calamities; and the rest sold for slaves, into all lands; and new colonies sent to re-people it; who found it in such a desolate state, as quite discouraged them from restoring it to its pristine fruitfulness); but much more since that emperor's time, in the inundations of the northern barbarians, of the Saracens, and of the more cruel and destructive Christians during the holy war; and in the oppression it now feels under the Turkish yoke; may be easily owned to be more than sufficient to have wrought the dismal change we are speaking of, and to have reduced the far greater part into a mere desert.

Nevertheless, if we may credit those who have viewed it in this doleful condition, they will tell us, there are still such visible signs of its natural richness and fertility, as plainly shew, that the bare want of culture is the main, if not the only cause of its present poverty and barrenness. We shall hint, as a further proof of this, what a learned traveller hath lately written of it from his own observations.

"The Holy Land," says Dr Shaw, "were it as well peopled and cultivated as in former times, would still be more fruitful than the very best part of the coast of Syria and Phœnicia; for the soil is generally much richer, and, all things considered, yields a more preferable crop. Thus the cotton that is gathered in the plains of Ramah, Esdraelon, and Zabulun, is in greater esteem than what is cultivated near Sidon and Tripoli. Neither is it possible for pulse, wheat, or any sort of grain, to be more excellent than what is sold at Jerusalem. The barrenness, or scarcity rather, which some authors may, either ignorantly or maliciously, complain of, doth not proceed from the incapacity or natural unfruitfulness of the country, but from the want of inhabitants, and the great aversion there is to labour and industry in those few who possess it. There are, besides, such perpetual discords and depredations among the petty princes who share this fine country, that, allowing it was better peopled, yet there would be small encouragement to sow, when it was uncertain who should gather in the harvest. Otherwise, the land is a good land, and still

Palestine.

Palestina fill capable of affording its neighbours the like supplies of corn and oil which it is known to have done in the time of Solomon."

Palingenius

PALESTRINA, a town of Italy, in the Campagna di Roma, with a bishop's see. It is the capital of a principality of the same name, and the bishop is one of the six cardinals. It was anciently famous for the temple of Fortune, being then called *Præneste*, and seated on the top of a mountain, the ruins of which may yet be seen. E. Long. 12. 55. N. Lat. 41. 51.

PALESTRINA, is one of the largest and most populous of the islands called the *Lagunes*, near Venice, and where the most considerable of the noblemen have houses of pleasure. It is 15,000 paces in length, and 400 in breadth; the principal harbour has also the same name.

PALFIN (John), an eminent surgeon, anatomist, and reader in surgery at Ghent, the place of his birth; acquired great reputation by his learning and works. The principal of these are, 1. A treatise on Osteology, in 12mo, Paris 1731. 2. Anatomy of the human body, in 2 vols 8vo, Paris 1734. He died at Ghent at a great age, in 1730.

PALFREY, is one of the better sort of horses used by noblemen or others for state; and sometimes of old taken for a horse fit for a woman to ride. Camden says, that William Fauconberge held the manor of Cokeny, in the county of Nottingham, in fergeantry, by the service of shoeing the king's palfrey when the king should come to Mansfield.

PALCATE, a sea-port town of India, on this side of the Ganges. It is seated on the coast of Comorandell, in the kingdom of Carnate, 70 miles north of Fort St George. Here the dutch have a factory, and fort called the *Fort of Guelderland*. E. Long. 80. 1. N. Lat. 13. 34.

PALINURI PROMONTORIUM, (Virgil, Velleius,) with a cognominal port, was situated at the fourth extremity of the Sinus Pæsthanus, on the coast of Lucania; so called from Palinurus, Æneas's steersman, who there perished. (Mela, Dionysius Halicarnassæus.)

PALINDROMUS, a verse or sentence which runs the same when read either backwards or forwards. Such is the verse,

Roma tibi subito motibus ibi amor.

Some people of leisure have refined upon the Palindromus, and composed verses, each word of which is the same backwards as forwards; for instance, that of Camden:

Odo tenet mulum, madidam mappam tenet Anna.

Anna tenet mappam madidam, mulum tenet Odo.

PALINGENESIA, among divines, the same with regeneration. Among chemists, it denotes the producing of a body from its principles.

PALINGENIUS (Marcellus), well known by a poem divided into 12 books, and intitled *Zodiacus Vitæ*, which he was several years of composing, and dedicated to Hercules II. of Este, duke of Ferrara. Some say he was physician to the prince: others rank him among the learned Lutherans to whom the dukes of Ferrara gave a reception in her court and honoured with her protection. His *Zodiac* contains good things, and is a philosophical satire against immorality and false prejudices. Though this poem has borne a

multitude of impressions, the author's life is but little known. He died some time between the years 1537 and 1543.

PALINODY, a discourse contrary to a preceding one: hence the phrase of *palinodius canere* was taken for a recantation.

PALISADES, in fortification, stakes made of strong split wood, about nine feet long, six or seven inches square, three feet deep in the ground, in rows about two and an half or three inches asunder, placed in the covert way, at three feet from, and parallel to, the parapet or side of the glacies, to secure it from surprise. They are also used to fortify the avenues of open forts, gorges, half-moons, the bottoms of ditches, and in general all posts liable to surprise. They are usually fixed perpendicularly, though some make an angle inclining towards the ground next the enemy, that the ropes cast over them to tear them up may slip off.

Turning **PALISADES**; an invention of Mr Coehorn, in order to preserve the palisades of the covert way from the beligers' shot. They are so ordered, that as many of them as stand in the length of a rod, or about ten feet, turn up and down like traps, so as not to be in sight of the enemy till they just bring on their attack; and yet are always ready to do the proper service of palisades.

PALISSE, in heraldry, a bearing like a range of palisades before a fortification, represented on a fesse, rising up a considerable height, and pointed a-top, with the field appearing between them.

PALIURUS, in botany. See **RHAMNUS**.

PALL, in heraldry, a figure like a Greek T, about the breadth of a pallet; it is by some heralds called a *cross-pall*, on account of its being looked upon as an archiepiscopal bearing.

PALLA, in Roman antiquity, a mantle which women wore over the gown called *stola*. It was borne on the left shoulder; whence passing to the other side, under the right arm, the two ends were bound under the left arm, leaving the breast and arm quite bare.

PALLADIO (Andrea), a celebrated Italian architect of the 16th century, was a native of Vicenza in Lombardy, and the disciple of Trissin. He made exact drawings of the principal works of antiquity to be met with at Rome, adding commentaries to them, which went through several impressions. But this, though a very useful work, was greatly exceeded by the Treatise of Architecture in four books, which he published in 1570. Inigo Jones wrote some excellent remarks on it; which were included in an edition of Palladio, published by Leoni, in 2 vols folio, 1742.

PALLADIUM, in antiquity, a statue of the goddess Pallas, supposed to have dropped down from heaven, preserved in Troy, whereon the fate of that city is said to have depended. It is said that there was anciently a statue of Pallas preserved at Rome, in the temple of Vesta, which some pretended to be the true palladium of Troy, brought into Italy by Æneas: it was kept among the sacred things of the temple, and only known to the priests and vestals. It was esteemed the destiny of Rome; and there were several others made perfectly like it to secure it from being stolen,

Palinody
Palladium

Pallet
Palm.

Palm
Palmyra.

as was that at Troy, which the oracle of Apollo declared should never be taken so long as the palladium was found within its walls: this occasioned Diomedes and Ulysses, in the time of the Trojan war, to undertake the stealing of it.

PALLET, among painters, a little oval table, or piece of wood, or ivory, very thin and smooth; on and round which, the painters place the several colours they have occasion for, to be ready for the pencil. The middle serves to mix the colours on, and to make the tints required in the work. It has no handle, but, instead thereof, a hole at one end to put the thumb through to hold it.

PALLET, among potters, crucible-makers, &c. a wooden instrument, almost the only one they use, for forming, heating, and rounding their works. They have several kinds: the largest are oval, with a handle; others are round, or hollowed triangularly; others, in fine, are in manner of large knives, serving to cut off whatever is superfluous on the moulds of their work.

PALLET, in gilding, an instrument made of a squirrel's tail, to take up the gold leaves from the pillow, and to apply and extend them on the matter to be gilt. See **GILDING**.

PALLET, in heraldry, is nothing but a small pale, consisting of one half of it in breadth, and therefore there are sometimes several of them upon one shield.

PALLET, is also a part belonging to the balance of a watch or movement. See the article **WATCH**.

PALLIATION, or a **PALLIATIVE Cure**, in medicine, is when, in desperate and incurable diseases, after predicting the fatal event, the physician prescribes some remedies for mitigating the pain or some other urgent symptoms, as in ulcerated cancers, or cancerous fistulas, and the like.

PALLIUM, a word often mentioned in our old historians. Durandus tells us, that it is a garment made of white wool, after the following manner, viz. The nuns of St Agnes, every year, on the feast-day of their saint, offer two white lambs on the altar of their church, during the time they sing *Agnus Dei*, in a solemn mass; which lambs are afterwards taken by two of the canons of the Lateran church, and by them given to the Pope's subdeacons, who fend them to pasture till shearing time, and then they are shorn, and the pall is made of their wool mixed with other white wool. The pall being thus made, is carried to the Lateran church, and there placed on the high altar, by the deacons of that church, on the bodies of St Peter and St Paul; and after an usual watching, it is carried away in the night, and delivered to the subdeacons, who lay it up safe. And because it was taken from the body of St Peter, it signifies the plenitude of ecclesiastical power: and therefore it was the prerogative of popes, who pretend to be the immediate successors of that saint, to invest other prelates with it; which at first was done nowhere but at Rome, tho' afterwards at other places.

PALM-SUNDAY, in the Christian church, the Sunday next before Easter; being so called in memory of our Saviour's triumphal entry into Jerusalem, when the multitude that attended him threw branches on his way.

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PALM-Tree, in botany. See **PHOENIX**.

PALMA, or **PALMA Nova**, a very strong town of Italy, in the territory of Venice, and in Friuli. It is a very important place, for the defence of the Venetians against the Austrians and Turks; and was built in 1593, for that very purpose. They have cut a canal near this place, which is very advantageous. It is seated on the sea-side, 10 miles south-east of Udino, and 55 north-east of Venice. E. Long. 13. 25. N. Lat. 46. 2.

PALMA, an island in the Atlantic Ocean, and one of the Canaries, 36 miles north-west of Gomera, and about 75 in circumference. It abounds in wine and sugar; and has a handsome town of the same name, which carries on a trade in wine to the West Indies and other parts. Their best vines grow in a soil called the *Brenia*, where they make 12,000 butts of wine every year, which is well known by the name of *palm-wine*. There is plenty of cattle, and all sorts of fruits. In 1625 a volcano broke out in this island, with a most violent earthquake; the flame was seen for six weeks together, and a great quantity of ashes were thrown as far as Teneriff. It was conquered by the Spaniards in 1460.

PALMARIS MUSCLE, in anatomy. See there, *Table of the muscles*.

PALMISTRY, something resembling the shape of the hand: thus we say, palmated leaves, roots, flowers, &c.

PALMIPEDES, among ornithologists, the same with web-footed birds. See **ORNITHOLOGY**.

PALMISTRY, a kind of divination, or rather a deceitful art practised by gypsies, who pretend to foretell events by looking upon the lines and marks of the hand.

PALMYRA, or **TADMOR**, a noble city of ancient Syria, now in ruins, the origin of whose name is uncertain. Neither is it well known by whom this city was built; for though, from the identity of the names, it is thought by many to have been the *Tadmor in the wilderness* built by Solomon, this point is much controverted by many learned men. Nor have we any authentic history of it till after the captivity of the Roman emperor, Valerian, by the Persians. At that time it was become an opulent city, to which its situation in the vicinity of the Roman and Parthian empires greatly contributed; as the caravans, in going to or returning from the East, frequented the place, and thus rendered it a considerable seat of merchandise. It enjoyed an independency till the time of Trajan; who, having made himself master of almost all the Parthian empire, reduced Palmyra likewise, and it was afterwards accounted part of the Roman dominions. But when the defeat and captivity of Valerian had so much weakened the empire, that the Persians seemed to be in a fair way of becoming masters of all the eastern provinces, the Palmyrenians began to entertain thoughts of recovering their liberty. Odenathus, prince of Palmyra, sent a very respectful letter to Sapor on his return, accompanied with considerable presents; but by that haughty conqueror his letter and embassy were treated with the most provoking contempt. The presents were thrown into the Euphrates: and to his letter Sapor replied, That his insolence in presuming to write to his lord was inexcusable; but if he could

Palmyra. atone for it in any way, it would be by presenting himself before the throne bound hand and foot, in token of a consciousness of his crime, and the punishment he deserved. With this injurious treatment Odenathus was so provoked, that he swore either to bring down the pride of the haughty conqueror, or die in the attempt. Accordingly, having assembled what forces he could, he fell upon the Persians, destroyed a number of them, took a great part of their baggage, and some of the king's concubines. Of the war of Odenathus with the Persians, however, we know very little: only that though the latter were often vanquished, and the independency of Palmyra established for the present; yet Valerian was never released from his captivity, tho' Odenathus earnestly wished to have the honour of releasing him from his enemies.

Odenathus enjoyed his sovereignty but a very short time; being murdered by his nephew, who was soon after put to death by Zenobia the wife of Odenathus. This lady is said to have been possessed of very extraordinary endowments both of body and mind, being, according to Mr Gibbon, almost the only Asiatic woman who is recorded to have overcome the obstacles arising from the confined situation of the fair sex in that part of the world. Immediately on taking vengeance for the murder of her husband, she assumed the government, and soon strengthened herself so much, that she resolved to submit neither to the Roman nor Persian power. The neighbouring states of Arabia, Armenia, and Persia, dreaded her enmity, and solicited her alliance. To the dominions of Odenathus, which extended from the Euphrates to the frontiers of Bithynia, his widow added the inheritance of her ancestors, the populous and fertile kingdom of Egypt. The emperor Claudius acknowledged her merit, and was content, that, while he pursued the Gothic war, she should assert the dignity of the empire in the east. The conduct, however, of Zenobia, was attended with some ambiguity; nor is it unlikely that she had conceived the design of erecting an independent and hostile monarchy. She blended with the popular manners of Roman princes the stately pomp of the courts of Asia, and exacted from her subjects the same adoration that was paid to the successors of Cyrus. She bestowed on her three sons a Latin education, and often shewed them to the troops adorned with the imperial purple. For herself she reserved the diadem, with the splendid but doubtful title of *Queen of the East*.

When Aurelian passed over into Asia, against an adversary whose sex alone could render her an object of contempt, his presence restored obedience to the province of Bithynia, already shaken by the arms and intrigues of Zenobia. Advancing at the head of his legions, he accepted the submission of Ancyra; and was admitted into Tyana, after an obstinate siege, by the help of a perfidious citizen. The generous, tho' fierce temper of Aurelian, abandoned the traitor to the rage of the soldiers; a superstitious reverence induced him to treat with lenity the countrymen of Apollonius the philosopher. Antioch was deserted on his approach; till the emperor, by his salutary edicts, recalled the fugitives, and granted a general pardon to all who, from necessity rather than choice, had been engaged in the service of the Palmyrenian queen. The unexpected mildness of such a conduct reconciled the minds of the

Syrians, and, as far as the gates of Emesa, the wishes of the people seconded the terror of his arms.

Zenobia would have ill deserved her reputation, had she indolently permitted the emperor of the West to approach within 100 miles of her capital. The fate of the East was decided in two great battles; so similar in almost every circumstance, that we can scarcely distinguish them from each other, except by observing that the first was fought near Antioch, and the second near Emesa. In both, the queen of Palmyra animated the armies by her presence, and devolved the execution of her orders on Zabdas, who had already signalized his military talents by the conquest of Egypt. The numerous forces of Zenobia, consisted for the most part of light archers, and of heavy cavalry clothed in complete steel. The Moorish and Illyrian horse of Aurelian were unable to sustain the ponderous charge of their antagonists. They fled in real or affected disorder, engaged the Palmyrenians in a laborious pursuit, harassed them by a desultory combat, and at length discomfited this impetrate but unweildy body of cavalry. The light infantry, in the mean time, when they had exhausted their quivers, remaining without protection against a closer onset, exposed their naked sides to the swords of the legions. Aurelian had chosen these veteran troops, who were usually stationed on the Upper Danube, and whose valour had been severely tried in the Allemannic war. After the defeat of Emesa, Zenobia found it impossible to collect a third army. As far as the frontier of Egypt, the nations subject to her empire had joined the standard of the conqueror; who detached Probus, the bravest of his generals, to possess himself of the Egyptian provinces. Palmyra was the last resource of the widow of Odenathus. She retired within the walls of her capital; made every preparation for a vigorous resistance; and declared with the intrepidity of a heroine, that the last moment of her reign and of her life should be the fame.

In his march over the sandy desert, between Emesa and Palmyra, the emperor Aurelian was perpetually harassed by the Arabs; nor could he always defend his army, and especially his baggage, from those flying troops of active and daring robbers, who watched the moment of surprise, and directed the slow pursuit of the legions. The siege of Palmyra was an object far more difficult and important; and the emperor, who with incessant vigour pressed the attacks in person, was himself wounded with a dart. "The Roman people," (says Aurelian, in an original letter), speak with contempt of the war which I am waging against a woman. They are ignorant both of the character and of the power of Zenobia. It is impossible to enumerate her warlike preparations, of stones, of arrows, and of every species of missile weapons. Every part of the walls is provided with two or three ballistæ, and artificial fires are thrown from her military engines. The fear of punishment has armed her with a desperate courage. Yet I trust still in the protecting deities of Rome, who have hitherto been favourable to all my undertakings." Doubtful, however, of the protection of the gods, and of the event of the siege, Aurelian judged it more prudent to offer terms of an advantageous capitulation: to the queen, a splendid retreat; to the citizens, their ancient privileges. His proposals were obstinately rejected,

Palmyra. jected, and the refusal was accompanied with insult.

The firmness of Zenobia was supported by the hope, that in a very short time famine would compel the Roman army to repass the desert; and by the reasonable expectation that the kings of the East, and particularly the Persian monarch, would arm in the defence of their most natural ally. But fortune, and the perseverance of Aurelian, overcame every obstacle. The death of Sapor, which happened about this time, distracted the councils of Persia; and the inconsiderable succours that attempted to relieve Palmyra, were easily intercepted either by the arms or the liberality of the emperor. From every part of Syria a regular succession of convoys safely arrived in the camp, which was increased by the return of Probus with his victorious troops from the conquest of Egypt. It was then that Zenobia resolved to fly. She mounted the fleetest of her dromedaries; and had already reached the banks of the Euphrates, about 60 miles from Palmyra, when she was overtaken by the pursuit of Aurelian's light-horse, seized, and brought back a captive to the feet of the emperor. Her capital soon after surrendered, and was treated with unexpected lenity. The arms, horses, and camels, with an immense treasure of gold, silver, silk, and precious stones, were all delivered to the conqueror; who, leaving only a garrison of 600 archers, returned to Emesa, and employed some time in the distribution of rewards and punishments at the end of so memorable a war, which restored to the obedience of Rome those provinces that had renounced their allegiance since the captivity of Valerian.

When the Syrian queen was brought into the presence of Aurelian, he sternly asked her, How she had presumed to rise in arms against the emperors of Rome? The answer of Zenobia was a prudent mixture of respect and firmness: "Because I disdained to consider as Roman emperors, an Aureolus or a Galienus. You alone I acknowledge as my conqueror and my sovereign." But as female fortitude is commonly artificial, so it is seldom steady or consistent. The courage of Zenobia deserted her in the hour of trial; she trembled at the angry clamours of the soldiers, who called aloud for her immediate execution; forgot the generous despair of Cleopatra, which she had proposed as her model; and ignominiously purchased life by the sacrifice of her fame and her friends. It was to their counsels which governed the weakness of her sex, that she imputed the guilt of her obstinate resistance; it was on their heads that she directed the vengeance of the cruel Aurelian. The fame of Longinus, who was included among the numerous and perhaps innocent victims of her fear, will survive that of the queen who betrayed, or the tyrant who condemned him. Genius and learning were incapable of moving a fierce unlettered soldier, but they had served to elevate and harmonise the soul of Longinus. Without uttering a complaint, he calmly followed the executioner, pitying his unhappy mistress, and bestowing comfort on his afflicted friends.

Returning from the conquest of the East, Aurelian had already crossed the streights which divide Europe from Asia; when he was provoked by the intelligence that the Palmyrenians had massacred the governor and garrison which he had left among them, and again

erected the standard of revolt. Without a moment's deliberation, he once more turned his face towards Syria. Antioch was alarmed by his rapid approach, and the helpless city of Palmyra felt the irresistible weight of his resentment. We have a letter of Aurelian himself, in which he acknowledges, that old men, women, children, and peasants, had been involved in that dreadful execution, which should have been confined to armed rebellion: and although his principal concern seems directed to the re-establishment of a temple of the Sun, he discovers some pity for the remnant of the Palmyrenians, to whom he grants the permission of rebuilding and inhabiting their city. But it is easier to destroy than to restore. The seat of commerce, of arts, and of Zenobia, gradually sunk into an obscure town, a trifling fortress, and at length a miserable village. The ruins of its temples, palaces, and porticos of Grecian architecture, lie scattered over an extent of several miles. These magnificent remains were accidentally discovered by some English travellers from Aleppo about a century ago; and most splendid views have since been given of them by Messrs Wood and Dawkins, to whose work the curious reader is referred.

PALPABLE, something perceivable by the senses, particularly that of feeling.

PALPITATION of the Heart. See MEDICINE, n° 206. 395.

PALSY. Ibid. n° 190. 377—380. & p. 4870.

PALUDAMENTUM, in Roman antiquity, a habit that differed but little from the chlamys, except that his last belonged chiefly to the lower class of people.

PALUS MEOTIS, the ancient name of a gulph between Europe and Asia, to the north of the Black Sea, now called the *sea of Zabach*, or *Asoch*.

PALY, or PALE, in heraldry, is when the shield is divided into four or more equal parts, by perpendicular lines falling from the top to the bottom.

PALY Bende, is when the escutcheon is divided by perpendicular lines, which is *paly*; and also by diagonals, which is called *bendy*.

PAMPELUNA, the capital of the kingdom of Navarre in Spain, with a very strong citadel and rich bishopric. It is handsome and populous, and carries on a great trade, seated in a very fertile plain, in E. Long. 1. 25. N. Lat. 42. 42.

PAMPELUNA, a town of New Granada in South America, famous for its gold mines and numerous flocks of sheep. W. Long. 68. 30. N. Lat. 6. 30.

PAMPHYLIA, the ancient name of a country of Natolia in Asia, now called *Carimania* and *Cay-bay*, between Lycia and Cilicia, on the south coast, to the north of the Mediterranean sea.

PAN, in Pagan worship, the son of Mercury and Penelope (the wife of Ulysses), who was ravished by that god in the form of a white goat, while he was keeping her father's flocks. He was educated on Mount Menelaus, in Arcadia, by Sinoe, and the other nymphs, whom he attracted by his music. He afterwards distinguished himself in the war with the giants, when he entangled Typhon in his nets. He attended Bacchus in his Indian expedition; and when the Gauls were about to pillage the temple of Delphos, he struck them with such a sudden consternation by night, that they fled,

though none pursued them. He had a contest with Cupid; but was conquered by the little god, who punished him, by inspiring him with a passion for the nymph Syrinx, who treated him with disdain: but he closely pursuing her, overtook her by the river Ladon, when, invoking the Naiads, she was changed into a tuft of reeds, which the disappointed lover grasped in his arms; but observing, that as they trembled with the wind, they formed a murmuring sound, he made of them the pipe for which he became so famous. He charmed Luna in the shape of a beautiful ram, and had several other amours.

Pan is represented with a smiling ruddy face, a thick beard, with the horns, legs, feet, and tail of a goat; holding a shepherd's crook in one hand, and his pipe of unequal reeds in the other.

The abbe Banier remarks, that if ever the Greeks corrupted ancient history, it was in fabricating the fable of Pan. According to them, says Herodotus, Hercules Dionysius, or Bacchus, and Pan, were the last of all the gods: however, in the opinion of the Egyptians, Pan was one of the eight great divinities that formed the first class in their theology, which were the most powerful and the most ancient of all.

Diodorus makes him one of the attendants upon Osiris, in his Indian expedition. "Osiris," says this author, "took with him Pan, a person much respected throughout his dominions: for he had not only his statue afterwards placed in all the temples, but a city was built in the Thebaid; which, in honour of Pan, was called *Chemmis*, or *Chawmo*, a word that signifies in the Egyptian language the city of Pan."

The same author, however, tells us, that he was the leader of a troop of fauns and satyrs, or wild and rustic men, much addicted to singing, dancing, and feats of activity, who were presented to Osiris in Ethiopia, and with whom that prince was so much pleased, that he retained them in his service.

Pan was regarded by the Egyptians, after his apotheosis, as the god who presided over the whole universe, as *Pan, omnia*, implies. He represented nature and festivity; and was god of the woods and fields, wholly taken up with the pleasures of a country life; dancing constantly with the fauns and satyrs; and running after the nymphs, to whom he was such a terror, that it is supposed the word *panic* is derived from *Panici terrores*, with which those who were said to have seen him were seized. Apuleius, however, gives an agreeable description of him. "By chance the god Pan happened to be seated on a little eminence near a river; and, always constant in his love to the nymph Syrinx, transformed into a reed, he taught her to produce all kinds of agreeable sounds, while his goats were skipping round him, and feeding on the banks."

Lucian describes him as the companion, minister, and counsellor of Bacchus. He was a kind of Scrub, a drudge fit for all work, having been occasionally employed in the capacity of shepherd, musician, dancer, huntsman, and soldier. In short, he served not only as *maestro di capello*, in directing the Bacchanals, but was so expert in playing upon flutes, and was such an excellent piper on the fiftula, that Bacchus was never happy without him.

He was particularly honoured in Arcadia, where the shepherds offered him milk and honey in wooden

bowls: when successful in hunting, they gave him a part of the spoils; but if they caught nothing, they shewed their resentment by whipping his image.

The Romans adopted him amongst their deities under the names of *Lupercus* and *Lycæus*.

PANACEA, among physicians, denotes an universal medicine, or a remedy for all diseases; a thing impossible to be obtained.

PANADA, a diet consisting of bread boiled in water to the consistence of pulp, and sweetened with a little sugar.

PANAMA, the capital city of the province of Darien in South America, where the treasures of gold and silver, and the other rich merchandises of Peru, are lodged in magazines till they are sent to Europe. W. Long. 82. o. N. Lat. 9. o.

This town, which had been the gate through which an entrance was gained into Peru, had risen to great prosperity, when, in 1670, it was pillaged and burnt by pirates. It was rebuilt on a more advantageous spot, at the distance of four or five miles from the first. Its harbour, called *Perico*, is very secure. It is formed by an archipelago, consisting of 48 small islands, and is capable of containing the largest fleets.

This place, a little while after it was founded, became the capital of the kingdom of Terra Firma. Some hopes were at first entertained from the three provinces of Panama, Darien, and Veragua, which composed it; but this prosperity vanished instantaneously. The savages of Darien recovered their independence; and the mines of the two other provinces were found to be neither sufficiently abundant, nor of an alloy good enough to make it worth while to work them. Five or six small boroughs, in which are seen some Europeans quite naked, and a very small number of Indians, who have come to reside there, form the whole of this state, which the Spaniards are not ashamed of honouring with the great name of kingdom. It is in general barren and unwholesome, and contributes nothing to trade but pearls.

The pearl fishery is carried on in the islands of the gulph. The greatest part of the inhabitants employ such of their negroes in it as are good swimmers. These slaves plunge and replunge in the sea in search of pearls, till this exercise has exhausted their strength or their spirits.

Every negro is obliged to deliver a certain number of oysters. Those in which there are no pearls, or in which the pearl is not entirely formed, are not reckoned. What he is able to find beyond the stipulated obligation, is considered as his indisputable property: he may sell it to whom he pleases; but commonly he cedes it to his master at a moderate price.

Sea monsters, which abound more about the islands where pearls are found than on the neighbouring coasts, render this fishing dangerous. Some of these devour the divers in an instant. The manta fish, which derives its name from its figure, surrounds them, rolls them under its body, and suffocates them. In order to defend themselves against such enemies, every diver is armed with a poinard: the moment he perceives any of these voracious fish, he attacks them with precaution, wounds them, and drives them away. Notwithstanding this, there are always some fishermen destroyed, and a great number crippled.

Panari
Panax.

The pearls of Panama are commonly of a very fine water. Some of them are even remarkable for their size and figure: these were formerly sold in Europe. Since art has imitated them, and the passion for diamonds has entirely superseeded or prodigiously diminished the use of them, they have found a new mart more advantageous than the first. They are carried to Peru, where they are in great estimation.

This branch of trade has, however, infinitely less contributed to give reputation to Panama, than the advantage which it hath long enjoyed of being the mart of all the productions of the country of the Incas, that are destined for the old world. These riches, which are brought hither by a small fleet, were carried, some on mules, others by the river Chagre, to Porto Bello, that is situated on the northern coast of the isthmus which separates the two seas.

PANARI, one of the Lipari islands lying in the Tuscan Sea. It is only five miles in circumference, and the soil is barren. E. Long. 15. o. N. Lat. 39. o.

PANARO, a river of Italy, which rises in the Appennines, crosses the valley of Frignano; and running on the confines of the Modenesé and Bolognese, waters Fenal, and falls into the Po at Bondeno, ten miles above Ferrara.

PANATHENÆA, in Grecian antiquity an ancient Athenian festival, in honour of Minerva the protectress of Athens, and called *Athenæa*. There were two festivals under this denomination, the greater and the lesser. The greater panathenæa were exhibited every five years; the less every three, or, according to some writers, annually. Though the celebration of neither, at first, employed more than one day; yet in after-times they were protracted for the space of many days, and solemnized with greater preparations and magnificence than at their first institution.

Prizes were established there for three different kinds of combat: the first consisted of foot and horse races; the second, of athletic exercises; and the third, of poetical and musical contests. These last are said to have been instituted by Pericles. Singers of the first class, accompanied by performers on the flute and cithara, exercised their talents here, upon subject prescribed by the directors of these exhibitions. And while the Athenian state was free and independent, the noble and generous actions of Harmodius and Aristogiton, who had opposed the power of the Pisistratids, and of Aristobulus, who had delivered the Athenians from the oppression of the thirty tyrants imposed upon them by the Lacedæmonians, were celebrated in these songs.

PANAX, GINSENG, a genus of the dioecia order, belonging to the polygamia class of plants. There are two species, the quinquefolium and trifolium. Both these are natives of North America. The former is generally believed to be the same with the Tartarian ginseng; the figures and descriptions of that plant which have been sent to Europe by the missionaries, agreeing perfectly with the American Plant. This hath a jointed, fleshy, and taper root, as large as a man's finger, frequently divided into two smaller fibres downwards. The stalks rises near a foot and an half high, and is naked at the top, where it gene-

rally divides into three smaller foot-stalks, each sustaining a leaf composed of five spear-shaped lobes, sawed on their edges: they are of a pale green, and a little hairy. The flowers grow on a slender foot-stalk, just at the division of the foot-stalks which sustain the leaves, and are formed into a small umbel at the top; they are of an herbaceous yellow colour, composed of small yellow petals, which are recurved. These appear the beginning of June; and are succeeded by compressed, heart-shaped berries, which are first green, but afterwards turn red; inclosing two hard, compressed, heart-shaped seeds, which ripen in the beginning of August. The second sort grows naturally in the same countries: but Mr Miller never saw more than one plant, which was sent to him from Maryland, and did not live beyond the first year; being planted in a dry soil, in a very dry season. The stalk was single, and did not rise more than five inches in height, dividing into three foot-stalks, each sustaining a trifoliate leaf, whose lobes were longer, narrower, and deeper indented on their edges, than the former. The flower-stalk rose from the divisions of the foot-stalk of the leaves; but before the flowers opened, the plant decayed.

Properties. The root of this plant is used in medicine. It is two or three inches long, taper, about the thickness of the little finger, often forked at the bottom, which gives it a distant resemblance of a man, whence it is called *ginseng*; it is elegantly striated with circular wrinkles; it is of a brownish yellow colour on the outside, and whitish or of a pale yellow within; on the top are commonly one or more little knots, which are the remains of the stalks of the preceding years, and from the number of which the age of the root is judged of. Those roots which are brought from China are somewhat paler than those from America, but in no other respect is any difference found.

The Chinese esteem the ginseng root as a general restorative and corroborant: to the taste it is mucilaginous, and sweet like liquorice; yet accompanied with a degree of bitterness and a slight aromatic warmth, with little or no smell: the sweet matter of these roots is preserved in the watery as well as in the spirituous extract, and so is their aroma; the spirituous extract is a pleasant warm bitterish sweet.

A dram of the ginseng root may be sliced and boiled in a quarter of a pint of water to about two ounces; then a little sugar being added, it may be drank as soon as it is cool enough: the dose must be repeated morning and evening; but the second dose may be prepared from the same portion of root which was used at first, for it may always be twice boiled. The plant has been introduced into the British gardens, and will thrive in those places where it hath a light soil and shady situation, and will produce flowers and seeds; but the latter, though in appearance ripe and perfect, will not produce any new plants, as Mr Miller says he has repeatedly made the experiment, and waited for them three years without disturbing the ground.

PANAY, an island of Asia, and one of the Philippines, lying between those of Paragoa and Negro. It is 250 miles in circumference, and is the most populous and fertile of them all. It is watered by a great

Panari,
Panay.

PANACARPUS great number of rivers and brooks, and produces a great quantity of rice.

Pandora.

PANACARPUS, in Roman antiquity, a kind of shew which the Roman emperors frequently exhibited to the people. In this spectacle, the Circus being all fet over with large trees, represented a forest, into which the beasts being let from the dens underground, the people, at a sign given by the emperor, pursued, shot, and killed all they could lay hold of, which they afterwards carried away, to regale upon at home. The beasts usually given on these occasions were boars, deers, oxen, and sheep.

PANCIROLLUS (Guy), a famous lawyer of Rhegium, was a person of an excellent genius, which he cultivated with the greatest care in the principal universities of Italy; and was afterwards ordinary professor of law at Padua. Philibert Emanuel, duke of Savoy, invited him to his university in 1571, where he composed his ingenious treatise *De rebus inventis et deperditis*. But the air of Turin not agreeing with him, he there lost an eye; and, for fear of losing the other, returned to Padua, where he died in 1591.

PANCREAS, in anatomy. See there, n° 356.

PANDATARIA, (Suetonius, Pliny, Strabo); *Pandateria*, (Mela, Tacitus): An island in the Tuscan sea; a place of banishment for the more illustrious exiles. Hither Julia, the daughter of Augustus, was banished for her incontinence. To this island Tiberius banished Agrippina, his daughter-in-law, (Suetonius). It was the place of confinement of Octavia, the daughter of Claudius, married to Nero; a sight that affected every eye, (Tacitus). Now *Santa Maria*, situate between Pontia and Ichia, (Hollenius).

PANDECTS, **PANDECTÆ**, in jurisprudence, the digest, or collection, made by Justinian's order, of 529 decisions or judgments of the ancient lawyers, on so many questions occurring in the civil law; to which that emperor gave the force and authority of law, by the epistle prefixed to them.—The word is Greek, *πανδectes*, compounded of *παν*, "all," and *δικομαι*, *capio*, "I take;" *q. d.* a compilation, or a book containing all things.—Though others, as Bartoli, will have it formed from *παν*, and *δικομαι*, as if these books contained the whole doctrine of the law.

The pandects consist of 50 books, and make the first part of the body of the civil law.

They were denoted by two *¶¶*; but the copists taking those *¶¶* for *ff*, the custom arose of quoting them by *ff*.

The *Florentine pandects*, are those printed from a famous ancient manuscript at Florence.

Papias extends the denomination of *pandects*, to the Old and New Testament.

There are also *Pandecta Medicinæ*, "Pandects of Medicine;" a kind of dictionary of things relating to medicine, compiled by Mat. Sylvaticus of Mantua, who lived about the year 1297. Leclausius has published *Pandects of Turkey*; and bishop Beveridge, *Pandecta canonum*.

PANDICULATION, a stretching; or that violent and tense motion of the solids, which usually accompanies the act of yawning.

PANDORA, in fabulous history, a woman formed by Prometheus, to whom each of the gods gave some

perfection. Venus bestowed upon her beauty; Pallas, wisdom; Juno, riches; Apollo, music; and Mercury, eloquence; but Jupiter being displeased at Prometheus for having stolen fire from heaven to animate the mass he had formed, gave Pandora a box, which she was ordered not to open; and then sent her to the earth with this box, in which were inclosed age, diseases, pestilence, war, famine, envy, discord, and all the evils and vices that could afflict mankind. This fatal box was opened by Epimetheus, Prometheus's brother, when instantly all the diseases and mischiefs with which it was filled spread over the earth, and Hope alone remained at the bottom.

PANDOURS, are Hungarian infantry: they wear a loose garment fixed tight to their bodies by a girdle, with great sleeves, and large breeches hanging down to their ancles. They use fire-arms, and are excellent marksmen: they also use a kind of fabre near four feet long, which they use with great dexterity.

PANDOSIA, (Livy, Justin, Strabo), an inland town of the Bruttii, and a place of strength, on the river Acheron, where Alexander of Epirus, deceived by the oracle of Dodona, met his fate and perished. Now *Mendicino*, (Hollenius). Another of Epirus, (Strabo); situate on the river Acheron, (Livy); which Alexander of Epirus was advised to avoid as fatal, but which he met with in Italy. This last is said to have been the residence of the Oenotrian kings, (Strabo.)

PANEAS, (Pliny, Josephus); the apparent spring from which the Jordan rises, on the extremity of the west side of the Trachonitis, (Pliny).

PANEAS, (Coins, Pliny, Josephus), the name of a district adjoining to the spring *Paneas*, with a cognominal town, either enlarged and adorned, or originally built, by Philip son of Herod, and called *Cæsarea*, by Josephus; and in St Matthew, *Cæsarea of Philip*; with a temple erected to Augustus his benefactor, who conferred the Trachonitis upon him, (coin). It was afterwards called *Neronias*, in honour of Nero, (Josephus).

PANEGYRIC, an oration in praise of some extraordinary thing, person, or virtue.

The name is Greek, *πανηγυρις*; formed of *παν*, "all," and *αγορα*, "I assemble;" because anciently held in public and solemn assemblies of the Greeks, either at their games, their feasts, fairs, or religious meetings.

PANEGYRICUM, in church-history, an ecclesiastical book, used by the Greek church, containing the panegyric orations of various authors, on the solemnities of Jesus Christ and the saints.

Among the principal authors of this work are Athanasius, Cyrill, Basil, Chrysostom, &c.

PANEL, (*Panella*, *Panellum*), according to Sir Edw. Coke, denotes a little part; but the learned Spelman says, that it signifies *schedula vel pagina*, a "schedule or roll;" as a panel of parchment, or a counterpane of an indenture: but it is used more particularly for a schedule or roll, containing the names of such jurors as the sheriff returns to pass upon any trial. And the *impanelling* a jury is the entering their names in a panel, or little schedule of parchment.

PANEL, in Scots law, signifies the prisoner at the bar, or person who takes his trial before the court of judicatory for some crime.

Pangonia

Panthcon.

PANGONIA, in natural history, the name of a genus of crystals, consisting of such as are composed of many angles.

PANIC, denotes an ill-grounded terror or fright. See **PAN**.

PANICLE, in botany, denotes a soft woolly beard, on which the seeds of some plants, as millet, reeds, and hay.

PANNELS of a SADDLE, are two cushions or bolsters, filled with cows, deer, or horse's hair, and placed under the saddle, on each side, to prevent the bows and bands from galling the horse.

PANNICULUS CARNOSUS, in comparative anatomy, a robust fleshy tunic, situated in beasts between the skin and the fat; by means of which they can move their skin in whole or in part. It is altogether wanting in mankind.

PANNONIA, (Pliny, Strabo, Dio), an extensive country of Europe, having the Danube on the north, Dalmatia on the south, Noricum on the west, and Moesia on the east. It is divided in *superior* and *inferior*, (Ptolemy, Dio). The common boundary between both were the river Arabo and mount Cetus, having the superior to the west, and the inferior on the east side. This division is thought to be no older than the times of the Antonines. *Pannonicus* the epithet, (Martial).

PANORMUS, (Polybius, Pausanias), a town of Achaia, in Peloponnesus, near the promontory Rhium.—Another, (Ptolemy, Pliny), a town on the north side of Crete.—A third, (Ptolemy), in Macedonia, on the Egean sea, near mount Athos.—A fourth, of Samos, (Livy).—A fifth, of Sicily; an ancient city, built by the Phœnicians, (Thucydides); a principal town of the Carthaginians, (Polybius); situate between Lilybæus and Pelorus, (Mela); a Roman colony. Now *Palermo*, capital of the island, on the north side. E. Long. 13. N. Lat. 38. 30.—A sixth Panormus of the Thracia Chersonesus, placed by Pliny on the west side of the peninsula, and mentioned by no other writer.

PANORMUS, (Ptolemy), a port of Attica; its name denoting it to be capacious.—Another, of Epirus, (Strabo, Ptolemy); a large harbour in the heart of the Montes Cerauni, below the citadel Chimæra.—A third, of Ionis, (Strabo); near Ephesus, with the temple of the Ephesian Diana.

PANORPA, the SCORPION-FLY, in zoology, a genus of insects belonging to the order of neuroptera. The rostrum is horny and cylindrical; there are two pappi, and three femorata; the feelers are longer than the thorax; and the tail of the male is furnished with a forceps. There are four species, distinguished by the colour and shape of their wings. They skip, and are found in meadows.

PANTALARIA, an island in the Mediterranean Sea, between Sicily and the main land of Africa, about 17 miles in circumference. It is near the coast of Tunis, and abounds in cotton, fruits, and wine; but the inhabitants are obliged to bring all their corn to Sicily, as it belongs to the king of the two Sicilies. E. Long. 12. 25. N. Lat. 36. 55.

PANTALOON, a sort of garment consisting of breeches and stockings all of one piece; said to have been first introduced by the Venetians.

PANTHEON, a beautiful edifice at Rome, anci-

ently a temple, dedicated to all the gods; but now converted into a church, and dedicated to the Virgin and all the martyrs.

This edifice is generally thought to have been built by Agrippa son-in-law to Augustus, because it has the following inscription on the frieze of the portico:

M. AGRIPPA L. F. COS. TERTIUM FECIT.

Several antiquarians and artists, however, have supposed that the pantheon existed in the times of the commonwealth; and that it was only embellished by Agrippa, who added the portico. Be this as it will, however, the pantheon when perfected by Agrippa was an exceedingly magnificent building; the form of whose body is round or cylindrical, and its roof or dome is spherical: it is 144 feet diameter within; and the height of it, from the pavement to the grand aperture on its top, through which it receives the light, is just as much. It is of the Corinthian order. The inner circumference is divided into seven grand niches, wrought in the thickness of the wall: six of which are flat at the top; but the seventh, opposite to the entrance, is arched. Before each niche are two columns of antique yellow marble fluted, and of one entire block, making in all 14, the finest in Rome. The whole wall of the temple, as high as the grand cornice inclusive, is cased with divers sorts of precious marble in compartments. The frieze is entirely of porphyry. Above the grand cornice arises an attic, in which were wrought, at equal distances, 14 oblong square niches: between each niche were four marble pilasters, and between the pilasters marble tables of various kinds. This attic had a complete entablature; but the cornice projected less than that of the grand order below. Immediately from the cornice springs the spherical roof, divided by bands, which cross each other like the meridians and parallels of an artificial terrestrial globe. The spaces between the bands decrease in size as they approach the top of the roof; to which, however, they do not reach, there being a considerable plain space between them and the great opening. That so bold a roof might be as light as possible, the architect formed the substance of the spaces between the bands, of nothing but lime and pumice stones. The walls below were decorated with lead and brass, and works of carved silver over them; and the roof was covered on the outside with plates of gilded bronze. There was an ascent from the springing of the roof to the very summit by a flight of seven stairs. And if certain authors may be credited, these stairs were ornamented with pedestal statues, ranged as an amphitheatre. This notion was founded on a passage of Pliny, who says, "That Diogenes the sculptor decorated the pantheon of Agrippa with elegant statues; yet that it was difficult to judge of their merit, upon account of their elevated situation." The portico is composed of 16 columns of granite, four feet in diameter, eight of which stand in front, with an equal intercolumniation all along, contrary to the rule of Vitruvius, who is for having the space answering to the door of a temple, wider than the rest. On these columns is a pediment, whose tympanum, or flat, was ornamented with bas-reliefs in brass; the cross beams which formed the ceiling of the portico were covered with the same metal, and so were the doors. The ascent up to the portico was by eight or nine steps.

Such was the pantheon, the richness of which induced

Pantheon. ced Pliny to rank it among the wonders of the world.

The eruption of Vesuvius, in the reign of Tiberius, damaged the pantheon very considerably; it was repaired by Domitian, which occasioned some writers to mention that prince as the founder of the building. The emperor Adrian also did something to it. But it appears, that the pantheon is more indebted to Septimius Severus, than to any one since its erection. The most, perhaps, that any of his predecessors had done, was the adding some ornament to it: Septimius bestowed essential reparations upon it. The following inscription appears upon the architrave:

IMP. CAES. SEPTIMIUS. SEVERVS.
PIVS PERTINAX.
ARABICVS. PARTHICVS. PONTIF.
MAX. TRIB. POT.
XI. COS. III. P. P. ET. IMP. CAES.
MARCVS.
AVRELIVS. ANTONINVS. PIVS.
FELIX. AVG. TRIB.
POT. V. COS. PROCOS. PANTHEVM.
VETVSTATE.
OBRYPTVM. CYM. OMNI. CVLTV.
RESTITVERVNT.

It is really a manner of astonishment, that a structure, which, granting it to have been built by Agrippa, was not more than 200 years old, should have fallen into decay through age. This single consideration seems sufficient to confirm the opinion of those who believe it to have stood in the time of the commonwealth.

The temple subsisted in all its grandeur, till the invasion of Alaric in the time of Honorius. Zozyms relates, that the Romans having engaged to furnish this barbarian prince with 3000 pounds weight of gold, and 5000 pounds weight of silver, upon condition that he should depart from their walls; and it proving impossible to raise those sums either out of the public treasury or private purses, they were obliged to strip the temples of their statues and ornaments of gold and silver. It is probable that the pantheon supplied a good part, as that of Jupiter Capitolinus was the only one in Rome that could vie with it for riches.

Alaric carried off nothing from the Romans besides their precious metals. Thirty-nine years after this, Genseric king of the Vandals took away part of their marbles; and whether from a greediness of plunder, or from a relish of the productions of art, loaded one of his ships with statues. It cannot be questioned, but that on this occasion the pantheon was forced to part with more of its ornaments, and that the inestimable works of Diogenes became the prey of this Barbarian.

Before these unwelcome visits of the Goths and Vandals, the Christian emperors had issued edicts for demolishing the pagan temples. But the Romans, whatever were their motives, spared the pantheon, which is known to have suffered no damage from the zeal of the pontiffs, or the indignation of the saints, before the first siege of Rome by Alaric. It remained so rich till about the year 655, as to excite the avarice of Constantine II. who came from Constantinople to pillage the pantheon, and executed his purpose so far as to strip it both of its inside and outside brazen coverings, which he transported to Syracuse, where they soon after fell into the hands of the Saracens.

About 50 years before this, pope Boniface IV. had

obtained the pantheon of the emperor Phocas, to make a church of it. The artifice of those days were totally ignorant of the excellence of the Greek and Roman architecture, and spoiled every thing they laid their hands upon. To this period, certain alterations are to be referred, of which we shall speak by and by.

After the devastations of the barbarians, Rome was contracted within a narrow compass: the seven hills were abandoned; and the Campus Martius, being an even plain, and near the Tyber, became the ground-plat of the whole city. The pantheon, happening to stand at the entrance of the Campus Martius, was presently surrounded with houses, which spoiled the fine prospect of it; and it was yet more deplorably disgraced by some of them which stood close to its walls. Pedlars shades were built even within its portico, and the intercolumniations were bricked up, to the irreparable damage of the matchless pillars, of which some lost part of their capitals, some of their bases, and others were chiselled out six or seven inches deep, and as many feet high, to let in polls. Which excavations are to this day half filled up with brick and mortar; a sad monument of the licentiousness of the vulgar, and of the stupid avarice of those who sold them the privilege to ruin the noblest piece of art in the world!

This disorder continued till the pontificate of Eugene IV. whose zeal for the decency of a consecrated place, prevailed upon him to have all the houses cleared away that incumbered the pantheon, and so the miserable barracks in the portico were knocked down.

From the time Constantius carried off the brass plating of the external roof, that part was exposed to the injuries of the weather; or at best was but slightly tiled in, till Benedict II. covered it with lead, which Nicholas V. renewed in a better style.

It does not appear that from this time to Urban VIII. any pope did any thing remarkable to the pantheon.

Raphael Urban, who had no equal as a painter, and who as an architect had no superior, left a considerable sum by his will for the reparation of the pantheon, where his tomb is placed. Perino de la Vagna, Jacomo Udino, Annibale Carracci, Flamingo Vacca, and the celebrated Archangelo Corelli, did the same. All the ornaments within, that have any claim to be called good, are of the latter times; the paintings merit esteem; and the statues, though not master-pieces, do honour to sculpture, which alone is a proof that they are posterior to the 15th century.

But, with all the respect due to a pontiff, who was otherwise a protector, and even a praeficer of the arts, it were much to be wished that Urban VIII. had not known that the pantheon existed. The inscriptions cut at the side of the door inform us, that he repaired it; yet, at the same time that he built up with one hand, he pulled down with the other. He caused two bell-fries of a wretched taste to be erected on the ancient front work; and he devised the portico of all the remains of its ancient grandeur, viz. the brazen coverings of the cross beams, which amounted to such a prodigious quantity, that not only the vast baldachin, or canopy, of the confessional in St Peter's, was cast out of it, but likewise a great number of cannon for the castle of St Angelo. This pope, who was of the family of Barbarini, presented also as much of this metal to his nephew, as was sufficient for the decoration

Pantheon of his new palace; on which occasion this remarkable pasquinade was stuck up,

Pantomime *Il fantasma di Barbara* *fervent Barbara* *fervent Barbara*.

If ever gingle added force to wit, it was certainly in this instance.

It is surprising, that whilst all these operations were carrying on in the portico, he never once thought of repairing the damages which time had wrought in it! Of the 16 pillars which supported this magnificent pile, there were no more than 13 left; the three next the temple of Minerva had disappeared; with these the entablature and an angle of the front had tumbled down. There were not wanting in Rome fragments enough of antique columns that might have been put together and set up, to have prevented the downfall of a pile which deserved to stand as long as the world endured.

Alexander VII. did what Urban VIII. had neglected to do. At the same time that Bernini was constructing the colonnade of St Peter, this pontiff ordered search to be made for pillars to match those of the portico of the pantheon; and some were found not far from the French church of St Lewis, of the very same model. They were granite of the isle of Ilva, and those of the portico were Egyptian granite; the colour, however, was the same, so that the effect was equal. The pope's zeal did not stop here; he caused all the old houses before the portico to be pulled down, and the soil and rubbish to be cleared away, which covered the steps, and even the bases of some of the pillars. He began covering the roof with marble, and raised a lantern over the aperture, to keep out rain; but death took him off before his project was completed. Clement IX. his successor, inclosed the portico within iron rails. Several later popes have added to its decorations, which were all in the taste of the times they were done in, and the body of the edifice and its architecture gained nothing from them. The main object of their holiness's liberality was the embellishment of the grand altar. One gave purple curtains, another beflowed silver tabernacles; others again vases, and superb dresses, suited to the solemn ceremonies of religion. All these might be called rich; but they had in no sense a tendency to retrieve the ancient majesty or original splendour of the temple. The true gusto of the ornaments was a little imitated at the revival of the arts. Good statues took place of the skeletons and squat figures that ridiculously disgraced the altars for the space of eight centuries. The paintings of Pergino, Cozza, and Gressi, covered the dull mosaics with which the Greeks of Constantinople had loaded the walls of most of the churches in Rome. The porphyry and the green and yellow antique, found among the old ruins, were employed to much advantage.

PANTHER, in zoology. See LEO.

PANTOMIME, Παντομιμος, among the ancients, a person who could imitate all kind of actions and characters by signs and gestures, without speaking.

The pantomimes made a part in the theatrical entertainments of the ancients; their chief employment was to express, in gestures and action, whatever the chorus sung, changing their countenance and behaviour as the subject of the song varied. They were very ancient in Greece, being derived from the heroic times, according to fable; but however this may be, they were certainly known in Plato's time. In Rome

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it was so late as the time of Augustus before they made their appearance. As to their dress, it was various, being always suited as near as possible to that of the person they were to imitate. The *crocata* was much used among the Roman pantomimes, in which and other female dresses they personated women.

PANUCO, a town and province of North America, in New Spain, lying to the north of Mexico, with a bishop's see. There are veins of gold, and salt-works, which are the principal revenue of the inhabitants. It is seated near the mouth of a river of the same name, at a small distance from the Gulf of Mexico. W. Long. 100 5. N. Lat. 24. 0.

PAPA, a small but strong town of Lower Hungary, in the county of Veszprém. It was taken from the Turks in 1683, after raising the siege of Vienna, and is subject to the house of Austria. It is seated on a mountain, near the river Marchaz, in E. Long. 18. 10. N. Lat. 47. 20.

PAPAYER, the POPPY; a genus of the monogynia order, belonging to the polyandria class of plants.

Species. 1. The *forniferum*, or *forniferous* common garden-poppy, rises with an upright smooth stalk, dividing or branching a yard or more high; garnished with large, deeply jagged, amplexicaule, smooth leaves; and terminated by large, spreading, dark-purple, and other coloured flowers, in the varieties, having smooth caps and capules, flowering in June and July. There are a great many varieties, some of them extremely beautiful. The white officinal poppy is one of the varieties of this fort. It grows often to the height of five or six feet, having large flowers both singles and doubles, succeeded by capules or heads as large as oranges, each containing about 8000 seeds. 2. The *rheoas*, or wild globular-headed poppy, rises with an upright, hairy, multiflorous stalk branching a foot and an half high; garnished with long, pinnatifid, deeply cut, hairy leaves; the stalk terminated by many red and other coloured flowers in the varieties, succeeded by globular smooth capules. The flowers appear in June. 3. The *Cambriucum*, or Welsh poppy, has a perennial root, pinnated cut leaves, smooth, upright, multiflorous stalks a foot and an half high; garnished with small pinnated leaves, and terminated by many large yellow flowers, succeeded by smooth capules. The flowers appear in June. 4. The *orientalis*, or oriental poppy, hath a large, thick, perennial root; long, pinnated, sawed leaves; upright, rough, uniflorous stalks, terminated by one deep red flower, succeeded by oval, smooth, capules. The flowers appearing in May.

Propagation. All the kinds are hardy, and will prosper any where. The two first species being annual, are to be propagated only by seeds; but the two last by parting the roots as well as the seeds.

Uff. The fonniferous quality of the white poppy is well known. This quality resides in the milky juice of the capsule containing the seeds, nor is it evaporated by drying the juice; hence the dried capsules are preferred in the shops for making the syrup. The inspissated juice itself is a kind of opium; and for an account of its virtues see the article *OPIMUM*. The seeds also make a very agreeable emulsion, but have no fonnific virtue.

PAPAW, or PAPA-TREE. See CARICA.—This tree

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is

Panico
Papaw.

is male and female upon different roots: the flowers of the former are white, and of the latter yellowish. The tender buds of these last are preferred into sweetmeats; and the long mango-popo, which is said to be little inferior to an East India mango, into pickles. When nearly ripe, the fruits are likewise boiled and eaten with any kind of flesh-meat, care being taken previously to cleanse them of the milky corrosive juice contained in them, which is so penetrating a nature, says Hughes, that if the unripe fruit, when unpeeled, is boiled with the toughest old salt meat, it will soon make it soft and tender; and, if hogs are for any considerable time fed with the raw fruit, it wears off all the mucous slimy matter which covers the inside of the guts; and would in time, if not prevented by a change of food, entirely lacerate them. This juice, according to Linnæus, is sometimes made use of to cure ring-worms and such cutaneous eruptions. It must be expelled by the medium of salt-water before the fruit is fit for use. It is remarkable, that the stalk of this plant is herbaceous and hollow; which last attribute has passed into a proverb in Barbadoes and other West India islands, where it is common to characterise a dissembler, by saying, that he is as hollow as a popo.

PAPER, sheets of a thin matter, made of some vegetable substance.

The materials on which mankind have, in different ages, contrived to write their sentiments, have been extremely various; in the early ages they made use of stones, and tablets of wood, wax, ivory, &c. See *Book*.

Paper, with regard to the manner of making it, and the materials employed therein, is reducible to several kinds; as Egyptian paper, made of the rush papyrus; bark-paper, made of the inner rind of several trees; cotton-paper; incombustible paper; and European paper, made of linen rags.

Egyptian paper was principally used among the ancients; being made of the papyrus, or biblus, a species of rush which grew on the bank of the Nile. In making it into paper, they began with lopping off the two extremes of the plant, the head and the root; the remaining part, which was the stem, they cut lengthwise into two nearly equal parts, and from each of these they stripped the scaly pellicles of which it consisted. The innermost of these pellicles were looked on as the best, and that nearest the rind as the worst: they were therefore kept apart, and made to constitute two different sorts of paper. As the pellicles were taken off, they extended them on a table, laying them over each other transversely, so as that the fibres made right angles: in this state they were glued together by the muddy waters of the Nile; or, when those were not to be had, with paste made of the finest wheat-flour, mixed with hot water and a sprinkling of vinegar. The pellicles were next pressed to get out the water, then dried, and lastly flattened and smoothed by beating them with a mallet: this was the Egyptian paper, which was sometimes farther polished by rubbing it with a glass-ball, or the like.

Bark-paper was only the inner whitish rind, inclosed between the bark and the wood of several trees, as the maple, plane, beech, and elm; but especially the tilia, or linden-tree, which was that mostly used for

this purpose. On this stripped off, flattened, and dried, the ancients wrote books, several of which are said to be still extant.

Chinese paper is of various kinds. Some is made of the rinds or barks of trees, especially the mulberry-tree and elm, but chiefly of the bamboo and cotton-tree. In fact, almost each province has its several paper. The preparations of paper made of the barks of trees, may be instanced in that of the bamboo, which is a tree of the cane or reed kind. The second skin of the bark, which is soft and white, is ordinarily made use of for paper: this is beat in fair water to a pulp, which they take up in large moulds, so that some sheets are above twelve feet in length; they are completed, by dipping them sheet by sheet in alum-water; which serves instead of the size among us, and not only hinders the paper from imbibing the ink, but makes it look as if varnished over. This paper is white, soft, and close, without the least roughness; though it cracks more easily than European paper, is very subject to be eaten by the worms, and its thinness makes it liable to be soon worn out.

Cotton-paper is a sort of paper which has been in use upwards of 600 years. In the French king's library are manuscripts on this paper, which appear to be of the 10th century; and from the 12th century, cotton manuscripts are more frequent than parchment ones. Cotton-paper is still made in the East Indies, by beating cotton-rags to a pulp.

Linen or European paper appears to have been first introduced among us towards the beginning of the 14th century; but by whom this valuable commodity was invented, is not known. The method of making paper of linen or hempen rags, is as follows: The linen-rags being carried to the mill, are first sorted, then washed very clean in puncheons, whose sides are grated with strong wires, and the bottoms bored full of holes. After this they are fermented, by laying them in heaps close covered with sack, till they sweat and rot, which is commonly done in four or five days. When duly fermented, they are twisted into handfuls, cut small, and thrown into oval mortars, made of well-seasoned oak, about half a yard deep, with an iron-plate at bottom, an inch thick, eight inches broad, and thirty long; in the middle is a washing-block, grooved, with five holes in it, and a piece of hair-sieve fastened on the inside; this keeps the hammers from touching it, and prevents any thing going out except foul water. These mortars are continually supplied with water, by little troughs from a cistern, fed by buckets fixed to the several floats of a great wheel, which raises the wooden hammers for pounding the rags in the mortars. When the rags are beaten to a certain degree, called the *first stuff*, the pulp is removed into boxes, made like corn-chandlers bins, with the bottom-board aslant, and a little separation on the front for the water to drain away. The pulp of the rags being in, they take away as many of the front-boards as are needful, and press the mass hard down with their hands; the next day they put on another board, and add more pulp, till the box is full; and here it remains mellowing a week, more or less, according to the weather. After this, the stuff is again put into clean mortars, and is beaten afresh, and removed into boxes, as before; in which state it is called the

the second stuff. The mafs is beat a third time, till fome of it being mixed with fair water, and brewed to and fro, appears like flour and water, without any lumps in it: it is then fit for the pit-mortar, where it is perfectly diffolved, and is then carried to the vat, to be formed into fheets of paper. But lately, inftead of pounding the rags to a pulp with large hammers, as above, they make ufe of an engine, which performs the work in much lefs time. This engine confifts of a round folid piece of wood, into which are faftened feveral long pieces of fteel, ground very fharp. This is placed in a large trough with the rags, and a fufficient quantity of water. At the bottom of the trough is a plate with fteel bars, ground fharp like the former; and the engine being carried round with prodigious velocity, reduces the rags to a pulp in a very fhort time. It muft be obferved, that the motion of the engine caufes the water in the trough to circulate, and by that means confantly returns the fluff to the engine. The trough is confantly fed with clean water at one end, while the dirty water from the rags is carried off at the other, through a hole, defended with wire gratings, in order to hinder the pulp from going out with the dirty water.

When the fluff is fufficiently prepared as above, it is carried to the vat, and mixed with a proper quantity of water, which they call *priming the vat*. The vat is rightly primed, when the liquor has fuch a proportion of the pulp, as that the mould, on being dipped into it, will juft take up enough to make a fheet of paper of the thicknefs required. The mould is a kind of fieve exactly of the fize of the paper to be made, and about an inch deep, the bottom being formed of fine brafs wire, guarded underneath with fticks, to prevent it bagging down, and to keep it horizontal; and further, to ftrengthen the bottom, there are large wires placed in parallel lines, at equal diftances, which form thofe lines vifible in all white paper when held up to the light: the mark of the paper is alfo made in this bottom, by interweaving a large wire in any particular form. This mould the maker dips into the liquor, and gives it a fhake as he takes it out, to clear the water from the pulp. He then fides it along a groove to the coucher, who turns out the fheet upon a felt laid on a plank, and lays another felt on it; and returns the mould to the maker, who by this time has prepared a fecond fheet in another mould: and thus they proceed, laying alternately a fheet and a felt, till they have made fix quires of paper, which is called a *poft*; and this they do with fuch fwiftnels, that, in many forts of paper, two men make 20 pofts and more in a day. A poft of paper being made, either the maker or coucher whiftles; on which four or five men advance, one of whom draws it under the prefs, and the reft prefs it with great force, till all the water is fqueezed from it; after which it is feparated fheet by fheet from the felts, and laid regularly one fheet upon another; and having undergone a fecond preffing, it is hung up to dry. When fufficiently dried, it is taken off the lines, rubbed fmooth with the hands, and laid by till fized; which is the next operation. For this they choofe a fine temperate day; and having boiled a proper quantity of clean parchment, or vellum-favings, in water, till it comes to a fize, they prepare a fine cloth, on which they fhew a due proportion of white vitriol and

roch alum finely powdered, and ftrain the fize through it into a large tub; in which they dip as much paper at once as they can conveniently hold, and with a quick motion give every fheet its fhare of the fize, which muft be as hot as the hand can well bear it. After this, the paper is preffed, hung up fheet by fheet to dry; and being taken down is forted, and what is only fit for outside-quires laid by themfelves: it is then fold into quires, which are folded and preffed. The broken fheets are commonly put together, and two of the worft quires are placed on the outside of every ream or bundle: and being tied up in wrappers, made of the fettling of the vat, it is fit for fale.

Paper is of various kinds, and ufed for various purpofes: with regard to colour, it is principally diftinguifhed into white, blue, and brown; and with regard to its dimenfions, into atlas, elephant, imperial, fuper-royal, royal, medium, demy, crown, fools-cape, and pot-paper.

Mr Guettard of the Royal Academy of Sciences in France has given an account of a number of experiments on materials for making paper; with a view, if poffible, to procure this ufeful fubftance from fuch others as are always to be had in greater plenty than rags can be got; of which there is fometimes a confiderable fcarcity. Mr Reaumur has obferved, that wafps have a method of preparing bits of rotten wood whereby they build their nefts, in fuch a manner, that it looks like ftrong paper or paper-board. Seba, in the firft volume of his *Natural Hiftory*, propofes the *alga marina*. "This country (fays he) does not feem to want trees fit for making paper, if people would give themfelves the neceffary trouble and expence. *Alga marina*, for example, which is compofed of long, ftrong, vifcous filaments, might it not be proper for this purpofe, as well as the mats of Mufcovy, if they were prepared as the Japanefe make their paper? The curious may at leaft try the experiment." P. du Halde, in the firft volume of his *Hiftory of China*, pretends, that the Chinefe make paper of the fecond bark of bamboo, of the bark of different trees, particularly the mulberry, of ftraw, rue, and hemp. Other authors mention its having been made of mallows, and feveral different kinds of herbs. All Mr Guettard's trials, however, proved unfuccefsful, and flax, cotton, hemp, and filk, feem to be the only materials of which it is poffible to make this valuable commodity. The reafon of thefe failures was, that the abovementioned fubftances only feem capable of being reduced to fibres indifinitely fine, and which at the fame time preferve a confiderable degree of toughnefs; all others being very coarfe in the fibre itfelf, and foon reducible to their ultimate finenefs; and what is worfe, the fibres are brittle, fo that the paper when made has no cohesion. Our author, however, has found, that paper may be made from flax, hemp, and filk, without the trouble of manufacturing them into cloth; and therefore he recommends the dreffings of the two former, which are fometimes in fuch abundance as to be thrown away; but if we confider the great trouble which muft be neceffary to bring thofe materials to a proper colour, and the great diminution of them which muft neceffarily enfue during the tedious operation, it is not probable that any advantage could be gained in this way.

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Preparation of PAPER for durable writing. For this purpose Dr Lewis recommends the impregnation of it with astringent materials. "It is observable (says he) that writings first begin to fade or change their colour on the back of the paper, where the larger strokes have sunk in, or are visible through it; as if part of the irony matter of the vitriol was in a more subtle or dissolved state than the rest, and sunk further, on account of its not being fully disengaged from the acid, or sufficiently combined with the astringent matter of the galls. Hence, it should seem probable, that if the paper was impregnated with astringent matter, the colour of the ink would be more durable. To see how far this notion was well founded, I dipped some paper in an infusion of galls; and, when dry, repeated the dipping a second and third time. On the paper thus prepared, and some that was unprepared, I wrote with different inks; several of which, that the effects might be more sensible, had an over-proportion of vitriol. The writings being exposed to the weather till the best of the inks on the unprepared paper had faded and changed their colour, those on the prepared paper were all found to retain their blackness. It is therefore recommended to the consideration of the paper-makers, whether a particular kind of paper might not be prepared for those uses where the long duration of the writing is of principal importance, by impregnating it with galls or other astringents, in some of the operations it passes through before it receives the glazing; as for instance, by using an astringent infusion, instead of common water, in the last operation, when the matter is reduced into a pulp for being formed into sheets. The brownish hue which the paper receives from the galling, would not perhaps be any great obstacle to its use; and, if the proposal should be thought worthy of being carried into execution, further inquiries may possibly discover the means of obviating the imperfection, and communicating astringency without colour.

Staining or Colouring of PAPER. The colours proper for paper are not different from those used for other substances, and are enumerated under the article *Colour-Making*. They are applied with soft brushes, after being tempered to a due degree with size or gum water. If the paper on which they are to be laid is soft, so that the colours are apt to go through, it must also be sized before they are laid on, or a proportionably larger quantity must be used along with the colours themselves. If a considerable extent of the paper is to be done over with one colour, it must receive several coatings, as thin as possible, letting each coat dry before another is put on, otherwise the colour will be unequal.

To gild PAPER. Take yellow oker, grind it with rain-water, and lay a ground with it upon the paper all over; when dry, take the white of eggs, beat it clear with white sugar-candy, and strike it all over: then lay on the leaf-gold; and, when dry, polish it with a tooth. Some take saffron, boil it in water, and dissolve a little gum with it; then they strike it over the paper, lay on the gold; and, when dry, they polish it.

To flosser PAPER, after the Chinese manner, without silver. Take two scruples of clear glue made of neats leather, one scruple of white allum, and half a pint

of clear water; simmer the whole over a slow fire, till the water is consumed, or the steam ceases: Then, your sheets of paper being laid on a smooth table, you dip a pretty large pencil into that glue, and daub it over as even as you can, repeating this two or three times: then sift the powder of talc through a fine sieve, made of horse-hair or gauze, over it; and then hang it up to dry; and, when dry, rub off the superfluous talc, which serves again for the same purpose. The talc you prepare in the following manner: Take fine white transparent Muscovy talc; boil it in clear water for four hours; then take it off the fire, and let it stand so for two days: then take it out, wash it well, and put it into a linen-rag, and beat it to pieces with a mallet: to 10 pounds of talc add 3 pounds of white allum, and grind them together in a little hand-mill; sift it through a gauze-sieve; and being thus reduced to a powder, put it into water, and just boil it up: then let it sink to the bottom, pour off the water from it, place the powder in the sun to dry, and it will become a hard confluence. This beat in a mortar to an impalpable powder, and keep it, for the use above-mentioned, free from dust.

PAPER-Hangings, furniture now greatly used, and generally approved, as it is at once airy and cheap.

The paper manufactured for hangings is of several kinds, some being made in representation of stucco work, for the covering ceilings or the sides of halls, stair-cases, passages, &c. and others in imitation of velvet, damask, brocades, chints, or other such silks and stuffs as are employed for hanging rooms. The principal difference in the manufacture lies, however, in the grounds: some of which are laid in varnish, and others in the common vehicles for water-colours; and in the raising a kind of coloured embossment by chopt cloth, which is called *flock-paper*.

Unwrought PAPER proper for Hangings.—The kind of paper employed for making the paper-hangings is a sort of coarse cartoon manufactured for this purpose; and there being a particular duty on paper-hangings, it is required, under considerable penalties, to be stamped before it be painted or otherwise decorated for this purpose. There is no occasion, however, to be more particular in explaining the qualities of this kind of unwrought paper; because it is to be had of all the great dealers in paper, manufactured in a proper manner.

White and coloured Grounds for PAPER-Hangings.—The common grounds laid in water are made by mixing whitening with the common glowers size, and laying it on the paper with a proper brush in the most even manner. This is all that is required, where the ground is to be left white; and the paper being then hung on a proper frame, till it be dry, is fit to be painted. When coloured grounds are required, the same method must be pursued, and the ground of whitening first laid; except in pale colours, such as straw-colours or pink, where a second coating may sometimes be spared, by mixing some strong colour with the whitening.

Manner of painting the PAPER-Hangings.—There are three methods by which paper-hangings are painted: the first by *printing* on the colours; the second by using the *stencil*; and the third by laying them on with a *pencil*, as in other kinds of painting.

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When the colours are laid on by printing, the impression is made by wooden prints; which are cut in such manner, that the figure to be expressed is made to project from the surface by cutting away all the other part; and this, being charged with the colours tempered with their proper vehicle, by letting it gently down on a block on which the colour is previously spread, conveys it from thence to the ground of the paper, on which it is made to fall more forcibly by means of its weight, and the effort of the arm of the person who uses the print. It is easy to conclude, that there must be as many separate prints as there are colours to be printed. But where there are more than one, great care must be taken, after the first, to let the print fall exactly in the same part of the paper as that which went before; otherwise the figure of the design would be brought into irregularity and confusion. In common paper of low price, it is usual, therefore, to print only the outlines, and lay on the rest of the colours by stencilling; which both saves the expence of cutting more prints, and can be practised by common workmen, not requiring the great care and dexterity necessary to the using several prints.

The manner of *stencilling* the colours is this. The figure, which all the parts of any particular colour make in the design to be painted, is to be cut out, in a piece of thin leather or oil-cloth, which pieces of leather or oil-cloth, are called *stencils*; and being laid flat on the sheets of paper to be printed, spread on a table or floor, are to be rubbed over with the colour, properly tempered, by means of a large brush. The colour passing over the whole is consequently spread on those parts of the paper where the cloth or leather is cut away, and give the same effect as if laid on by a print. This is nevertheless only practicable in parts where there are only detached masses or spots of colours: for where there are small continued lines, or parts that run one into another, it is difficult to preserve the connection or continuity of the parts of the cloth, or to keep the smaller corners close down to the paper; and therefore, in such cases, prints are preferable. Stencilling is indeed a cheaper method of ridding coarse work than printing: but, without such extraordinary attention and trouble as render it equally difficult with printing, it is far less beautiful and exact in the effect. For the outline of the spots of colour want that sharpness and regularity that are given by prints, besides the frequent extralinations, or deviations from the just figure, which happens by the original misplacing of the stencils, or the shifting the place of them during the operation.

Pencilling is only used in the case of nicer work, such as the better imitations of the India paper. It is performed in the same manner as other paintings in water or varnish. It is sometimes used only to fill the outlines already formed by printing, where the price of the colour, or the exactness of the manner in which it is required to be laid on, render the stencilling or printing it less proper; at other times, it is used for forming or delineating some parts of the design, where a spirit of freedom and variety, not to be had in printed outlines, are desired to be had in the work.

Management of the Flock PAPER.—The paper designed for receiving the flock is first prepared with a varnish-ground with some proper colour, or by that of the

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paper itself. It is frequently practised to print some Mosaic, or other small running figure in colours, on the ground, before the flock be laid on; and it may be done with any pigment of the colour desired, tempered with varnish, and laid on by a print cut correspondently to that end.

The method of laying on the flock is this. A wooden print being cut, as is above described, for laying on the colour in such manner, that the part of the design which is intended for the flock may project beyond the rest of the surface, the varnish is put on a block covered with leather or oil-cloth, and the print is to be used also in the same manner, to lay the varnish on all the parts where the flock is to be fixed. The sheet, thus prepared by the varnished impression, is then to be removed to another block or table; and to be strewn over with flock; which is afterwards to be gently compressed by a board, or some other flat body, to make the varnish take the better hold of it: and then the sheet is to be hung on a frame till the varnish be perfectly dry; at which time the superfluous part of flock is to be brushed off by a soft camel's-hair brush; and the proper flock will be found to adhere in a very strong manner.

The method of preparing the flock is, by cutting woollen-rags, or pieces of cloth with the hand, by means of a large bill or chopping knife; or by means of a machine worked by a horse-mill.

There is a kind of counterfeit flock-paper, which, when well managed, has very much the same effect to the eye as the real, though done with less expence. The manner of making this sort is, by laying a ground of varnish on the paper; and having afterwards printed the design of the flock in varnish, in the same manner as for the true; instead of the flock, some pigment, or dry colour, of the same hue with the flock required by the design, but somewhat of a darker shade, being well powdered, is strewn on the printed varnish; and produces nearly the same appearance.

PAPER-Money, is a term frequently made use of for bank-bills, which pass currently in trade instead of gold and silver.

Concerning this species of currency, the national utility of which has been controverted by some, we have the following observations in Dr Smith's Treatise on the Wealth of Nations: "The substitution of paper in the room of gold and silver money replaces a very expensive instrument of commerce with one much less costly, and sometimes equally convenient. Circulation comes to be carried on by a new wheel, which it costs less both to erect and maintain than the old one.

"When the people of any particular country have such confidence in the fortune, probity, and prudence of a particular banker, as to believe that he is always ready to pay upon demand such of his promissory notes as are likely at any time to be presented to him, those notes come to have the same currency as gold and silver money, from the confidence that such money can at any time be had for them.

"A particular banker lends among his customers his own promissory notes, to the amount, we shall suppose, of 100,000 l. As those notes serve all the purposes of money, his debtors pay him the same interest as if he had lent them so much money. This interest is the source of his gain. Though some of those notes are:

Paper.

are continually coming back upon him for payment, part of them continue to circulate for months and years together. Though he has generally in circulation, therefore, notes to the amount of 100,000 l. 20,000 l. in gold and silver may frequently be a sufficient provision for answering occasional demands. By this operation, therefore, 20,000 l. in gold and silver perform all the functions which 100,000 l. could otherwise have performed. Eighty thousand pounds of gold and silver can therefore, in this manner, be spared from the circulation of the country; and if different operations of the same kind should, at the same time, be carried on by many different banks and bankers, the whole circulation may be thus conducted with a fifth part only of the gold and silver.

"Let us suppose, for example, that the whole circulating money of some particular country amounted, at a particular time, to 1,000,000 sterling, that sum being then sufficient for circulating the whole annual produce of their land and labour. Let us suppose too, that, some time thereafter, different banks and bankers issued promissory notes, payable to the bearer, to the extent of 1,000,000, reserving in their different coffers 200,000 l. for answering occasional demands. There would remain, therefore, in circulation 800,000 l. in gold and silver, and 1,000,000 of bank-notes, or 1,800,000 l. of paper and money together. But the annual produce of the land and labour of the country had before required only 1,000,000 to circulate and distribute it to its proper consumers, and that annual produce cannot be immediately augmented by those operations of banking. One million, therefore, will be sufficient to circulate it after them. The goods to be bought and sold being precisely the same as before, the same quantity of money will be sufficient for buying and selling them. The channel of circulation, if I may be allowed such an expression, will remain precisely the same as before. One million we have supposed sufficient to fill that channel. Whatever, therefore, is poured into it beyond this sum, cannot run in it, but must overflow. One million eight hundred thousand pounds are poured into it. Eight hundred thousand pounds, therefore, must overflow, that sum being over and above what can be employed in the circulation of the country. But though this sum cannot be employed at home, it is too valuable to be allowed to lie idle. It will therefore be sent abroad, in order to seek that profitable employment which it cannot find at home. But the paper cannot go abroad; because, at a distance from the banks which issue it, and from the country in which payment of it can be exacted by law, it will not be received in common payments. Gold and silver, therefore, to the amount of 800,000 l. will be sent abroad, and the channel of home circulation will remain filled with 1,000,000 of paper, instead of 1,000,000 of those metals which filled it before.

"But though so great a quantity of gold and silver is thus sent abroad, we must not imagine that it is sent abroad for nothing, or that its proprietors make a present of it to foreign nations. They will exchange it for foreign goods of some kind or another, in order to supply the consumption either of some other foreign country or of their own.

"If they employ it in purchasing goods in one fo-

reign country in order to supply the consumption of another, or in what is called the *carrying trade*, whatever profit they make will be an addition to the neat revenue of their own country. It is like a new fund, created for carrying on a new trade; domestic business being now transferred by paper, and the gold and silver being converted into a fund for this new trade.

"If they employ it in purchasing foreign goods for home-consumption, they may either first purchase such goods as are likely to be consumed by idle people who produce nothing, such as foreign wines, foreign silks, &c.; or, secondly, they may purchase an additional stock of materials, tools, and provisions, in order to employ an additional number of industrious people, who re-produce, with a profit, the value of their annual consumption.

"So far as it is employed in the first way, it promotes prodigality, increases expence and consumption, without increasing production, or establishing any permanent fund for supporting that expence, and is in every respect hurtful to the society.

"So far as it is employed in the second way, it promotes industry; and though it increases the consumption of the society, it provides a permanent fund for supporting that consumption, the people who consume, re-producing, with a profit, the whole value of their annual consumption. The gross revenue of the society, the annual produce of their land and labour, is increased by the whole value which the labour of those workmen adds to the materials upon which they are employed; and their neat revenue by what remains of this value, after deducting what is necessary for supporting the tools and instruments of their trade.

"That the greater part of the gold and silver which, being forced abroad by those operations of banking, is employed in purchasing foreign goods for home-consumption, is and must be employed for purchasing those of this second kind, seems not only probable, but almost unavoidable. Though some particular men may sometimes increase their expence very considerably, though their revenue does not increase at all, we may be assured that no class or order of men ever does so; because, though the principles of common prudence do not always govern the conduct of every individual, they always influence that of the majority of every class or order. But the revenue of idle people, considered as a class or order, cannot in the smallest degree be increased by those operations of banking. Their expence in general, therefore, cannot be much increased by them, tho' that of a few individuals among them may, and in reality sometimes is. The demand of idle people, therefore, for foreign goods, being the same, or very nearly the same, as before, a very small part of the money, which being forced abroad by those operations of banking, is employed in purchasing foreign goods for home-consumption, is likely to be employed in purchasing those for their use. The greater part of it will naturally be destined for the employment of industry, and not for the maintenance of idleness.

"When we compute the quantity of industry which the circulating capital of any society can employ, we must always have regard to those parts of it only which consist in provisions, materials, and finished work: the other, which consists in money, and which serves only

Paper.

Paper.

to circulate those three, must always be deducted. In order to put industry into motion, three things are requisite; materials to work upon, tools to work with, and the wages or recompence for the sake of which the work is done. Money is neither a material to work upon, nor a tool to work with; and though the wages of the workman are commonly paid to him in money, his real revenue, like that of all other men, consists, not in the money, but in the money's worth; not in the metal pieces, but in what can be got for them.

"The quantity of industry which any capital can employ, must evidently be equal to the number of workmen whom it can supply with materials, tools, and a maintenance suitable to the nature of the work. Money may be requisite for purchasing the materials and tools of the work, as well as the maintenance of the workmen. But the quantity of industry which the whole capital can employ, is certainly not equal both to the money which purchases, and to the materials, tools, and maintenance, which are purchased with it; but only to one or other of those two values, and to the latter more properly than to the former.

"When paper is substituted in the room of gold and silver money, the quantity of the materials, tools, and maintenance, which the whole circulating capital can supply, may be increased by the whole value of gold and silver which used to be employed in purchasing them. The whole value of the great wheel of circulation and distribution is added to the goods which are circulated and distributed by means of it. The operation, in some measure, resembles that of the undertaker of some great work, who, in consequence of some improvement in mechanics, takes down his old machinery, and adds the difference between its price and that of the new to his circulating capital, to the fund from which he furnishes materials and wages to his workmen.

"What the proportion is which the circulating money of any country bears to the whole value of the annual produce circulated by means of it, it is perhaps impossible to determine. It has been computed by different authors at a fifth, at a tenth, at a twentieth, and at a thirtieth part of that value. But how small soever the proportion which the circulating money may bear to the whole value of the annual produce, as but a part, and frequently but a small part, of that produce, is ever destined for the maintenance of industry, it must always bear a very considerable proportion to that part. When, therefore, by the substitution of paper, the gold and silver necessary for circulation is reduced to perhaps a fifth part of the former quantity, if the value of only the greater part of the other four-fifths be added to the funds which are destined for the maintenance of industry, it must make a very considerable addition to the quantity of that industry, and consequently to the value of the annual produce of land and labour.

"An operation of this kind has, within these 25 or 30 years, been performed in Scotland, by the erection of new banking companies in almost every considerable town, and even in some country villages. The effects of it have been precisely those above described. The business of the country is almost entirely carried on by means of the paper of those different banking compa-

nies, with which purchases and payments of all kinds are commonly made. Silver very seldom appears, except in the change of a twenty shillings bank-note, and gold still feldomer. But though the conduct of all those different companies has not been unexceptionable, and has accordingly required an act of parliament to regulate it; the country, notwithstanding, has evidently derived great benefit from their trade. I have heard it asserted, that the trade of the city of Glasgow doubled in about 15 years after the first erection of the banks there; and that the trade of Scotland has more than quadrupled since the first erection of the two public banks at Edinburgh; of which the one, called *The Bank of Scotland*, was established by act of parliament in 1695, the other, called *The Royal Bank*, by royal charter in 1727. Whether the trade, either of Scotland in general, or of the city of Glasgow in particular, has really increased in so great a proportion during so short a period, I do not pretend to know. If either of them has increased in this proportion, it seems to be an effect too great to be accounted for by the sole operation of this cause. That the trade and industry of Scotland, however, have increased very considerably during this period, and that the banks have contributed a good deal to this increase, cannot be doubted.

"The value of the silver money which circulated in Scotland before the Union, in 1707, and which immediately after it was brought into the bank of Scotland in order to be re-coined, amounted to 411,117l. 10s. 9d. sterling. No account has been got of the gold coin; but it appears from the ancient accounts of the mint of Scotland, that the value of the gold annually coined somewhat exceeded that of the silver. There were a good many people too upon this occasion, who, from a diffidence of repayment, did not bring their silver in to the bank of Scotland; and there was, besides, some English coin which was not called in. The whole value of the gold and silver, therefore, which circulated in Scotland before the Union, cannot be estimated at less than 1,000,000 sterling. It seems to have constituted almost the whole circulation of that country; for though the circulation of the bank of Scotland, which had then no rival, was considerable, it seems to have made but a very small part of the whole. In the present times, the whole circulation of Scotland cannot be estimated at less than 2,000,000, of which that part which consists in gold and silver most probably does not amount to 500,000. But though the circulating gold and silver of Scotland have suffered to great a diminution during this period, its real riches and prosperity do not appear to have suffered any. Its agriculture, manufactures, and trade, on the contrary, the annual produce of its land and labour, have evidently been augmented."

PAPER-Office, an office in the palace of Whitehall, in which all the public writings, matters of state and council, proclamations, letters, intelligences, negotiations abroad, and generally all dispatches that pass through the offices of the secretaries of state, are lodged, by way of library.

PAPIER-MACHE. This is a substance made of cuttings of white or brown paper, boiled in water, and beaten in a mortar, till they are reduced into a kind of paste, and then boiled with a solution of gum Arabic

Paper,
Papier.

Paphla-
gonia
Papiilo.

arabic or of fize, to give tenacity to the paffe, which is afterwards formed into different toys, &c. by preffing it into oiled moulds. When dry, it is done over with a mixture of fize and lamp-black, and afterwards varnifhed. The black varnifh for thefe toys, according to Dr Lewis, is prepared as follows: Some colophony, or turpentine boiled down till it becomes black and friable, is melted in a glazed earthen vefel, and thrice as much amber in fine powder fprinkled in by degrees, with the addition of a little fpirit or oil of turpentine now and then: when the amber is melted, fprinkle in the fame quantity of farcocolla, continuing to ftir them, and to add more fpirit of turpentine, till the whole becomes fluid; then ftain out the clear through a coarfe hair-bag, preffing it gently between hot boards. This varnifh, mixed with ivory-black in fine powder, is applied, in a hot room, on the dried paper-paffe; which is then fet in a gently heated oven, next day in a hotter oven, and the third day in a very hot one, and let ftand each time till the oven grows cold. The paffe thus varnifhed is hard, durable, glosfy, and bears liquors hot or cold.

PAPHLAGONIA (anc. geog.) a country of the Hither Asia, beginning at Parthenius, a river of Bethlynia, on the weft, and extending in length to the Halys eaftward, with the Euxine to the north, and Galatia to the fouth. Pliny enlarges the limits on the weft fide to the river Billis, on this fide the Parthenius. It is called *Pylemenia* by fome, (Pliny). *Paphlagonia*, the people, mentioned by Homer, and therefore of no fmall antiquity. A fuperftitious and filly people, (Lucian); a brave people, (Homer); taking their name from Phaleg, (Bochart).

PAPHOS (anc. geog.) two adjoining iflands on the weft fide of the ifland of Cyprus; the one called *Pale-Paphos*, (Strabo, Ptolemy, Pliny); the other *Nea Paphos*; and when mentioned without an adjunct, this latter is always underftood. Both dedicated to Venus, and left undiftinguifhed by the poets, (Virgil, Horace). Hence Venus is furnamed *Paphia*; *Paphii* the people, (Coins, Stephanus). It was reftored by Auguftus, after a fhock of an earthquake, and called *Augufta*, (Dio).

PAPIAS, bifhop of Hieropolis, a city of Phrygia, was the difciple of St John the Evangelift, and the companion of Polycarp, as St Jerome obferves, and not of John the Ancient, as fome other authors have maintained. He compofed a work in five books, intitled *Expositions of the Difcourfes of our Lord*, of which there are only fome fragments now remaining. He it was who introduced the opinion of the Millennarians.

PAPILIO, the BUTTERFLY; in zoology, a genus of infefts belonging to the order of lepidoptera. It has four wings, imbricated with a kind of downy fcales; the tongue is convoluted in a fpiral form; and the body is hairy. There are 273 fpecies, principally diftinguifhed by the colour of their wings.

The world is well acquainted with the beauties of this part of the animal-creation; but Mr Reaumur has given accounts of fome very fingular fpecies, which derive a peculiar regard.

One fpecies of thefe he has called the *bundle of dry fowers*. This, when it is in a ftate of reft, has wholly the appearance of a little clufter of the decayed leaves of

some herb. The pofition and colour of its wings greatly favour this refemblance, and they have very large ribs; wholly like thofe of the leaves of plants, and are indented in the fame manner at their edges as the leaves of many plants are. This feems to point out the care of nature for the animal, and frequently may preferve it from birds, &c.

The fkill butterfly is another fingular fpecies, fo called from its head refembling, in fome degree, a death's head, or human fkill. This very remarkable appearance is terrible to many people; but it has another yet greater fingularity attending it, which is, that, when frighted, it has a mournful and harfh voice. This appeared the more furprizing to Mr Reaumur, as no other known butterfly had any the leaft voice at all; and he was not ready of belief that it was a real voice, but fufpected the noife, like that of the cicadee, to be owing to the attrition of fome part of the body; and, in fine, he, by great pains, difcovered that this noife was not truly vocal, but was made by a hard and brifk rubbing of the trunk againft two other hard bodies between which it is placed.

Another butterfly there is, fo fmall that it might be miftaken for a fmall fly. This is certainly the extreme in degree of fize of all the known butterflies, and cannot but have been proportionally fmall in the ftate of a caterpillar and chryfalis: this creature fpend its whole life in all the three ftages of caterpillar, chryfalis, and butterfly, on the leaf of thecelandine. It lives on the under fide of the leaf; and though in the caterpillar ftate it feeds on it, yet it does no damage. It does not eat the fubftance of the leaf, but draws from it only a fine juice, which is foon repaired again, without occafioning any change in the appearance of the leaf. This fpecies is very fhort-lived; and paffes through its three ftates in fo fhort a time, that there are frequently ten generations of it in one year; whereas, in all the other butterflies, two generations in the year are all that are to be had. Thefe two generations are fufficient to make a prodigious increafe: in a large garden, if there are twenty caterpillars in fpring, thefe may be overlooked, and there may be eafily concluded to be none there, even on a narrow fearch; but if thefe twenty caterpillars afterwards become twenty butterflies, ten of which are male and ten female, and each female lay the fame number of eggs that the common filk-worm does, that is, four hundred; if all the caterpillars hatched of thefe become butterflies, and thefe lay eggs in the fame proportion, which remain the winter, and come to be hatched in the fucceeding fpring; then from thefe twenty, in only one year, you will have eight hundred thoufand; and if we add to this the increafe of thefe in a fucceeding year, the account muft appear terrible, and fuch as no art could guard againft. The great ruler of the world has put fo many hindrances in the way of this over-abundant production, that it is very rare fuch years of deftruction happen. Some fuch have happened, however; and much mifchief has been dreaded from them, not only from their eating all the herbage, but from themfelves being eaten with herbs in fallads and otherwife: but experiments have proven this an erroneous opinion, and they are found to be innocent, and eatable as fnails or oysters.

PAPILIONACEOUS, among botanifts, an appellation

Papilio,
Papilionacea.

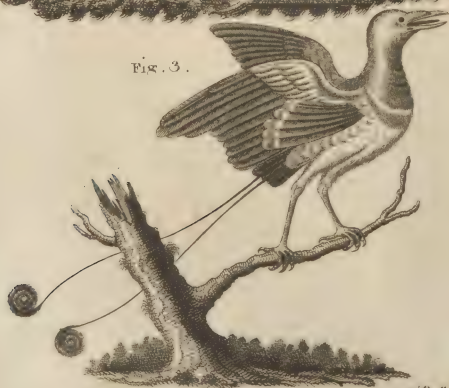
Fig.1. OTIS Tarda .



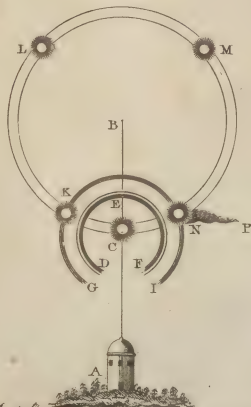
Bird of PARADISE .
Fig. 2 .



Fig. 3 .



PARHELION .
Fig. 4 .



Papinian
Papyrus.

pellation given to the flowers of plants belonging principally to the diabelloha class, from their resembling the wings of a butterfly.

PAPINIAN, a celebrated Roman lawyer of the third century, under the emperor Severus; who had so high an opinion of his worth, that he recommended his sons Caracalla and Geta to his care. Caracalla having first murdered his brother, ordered Papinian to compose a discourse to excuse this murder to the senate and people; which when he refused to undertake, the brutal emperor ordered him to be beheaded; and his body was dragged through the streets of Rome. Papinian wrote several treatises in the line of his profession.

PAPISTS, are those who profess the Popish religion in this kingdom; concerning whom there have been many statutes since the Reformation. See **NON-CONFORMISTS**.

PAPPUS, in botany, a soft downy substance that grows on the seeds of certain plants, as thistles, hawk-weed, &c. serving to scatter and buoy them up in the air.

PAPPUS, an eminent philosopher of Alexandria, said by Suidas to have flourished under the emperor Theodosius the Great, who reigned from A. D. 379 to 395. His writings shew him to have been a consummate mathematician: Many of them are lost; the rest continued long in manuscript, detached parts having only been occasionally published in the last century, until Carolus Manoleffius published his remains entire at Bologna in 1660, in folio.

PAPYRUS, called also *Cyperus Niliacus*, the plant from which the Egyptians were in use to make their paper. It is a large plant that grows wild in the middle of the stagnating water left in hollow places after the inundation of the Nile. We are told by Theophrastus and Pliny, that the natives used the root of it for firing, as well as for other purposes of wood: that they built little boats of the plant itself; and formed the inner bark into sails, garments, coverlids, and cordage; that they chewed it both raw and foddren, and swallowed the juice as a dainty; but, of all its uses, the most celebrated was that of its serving to write upon, like the paper of these days, which derives its name from this plant of Egypt. The intermediate part of the stalk was cut and separated into different laminæ, which were set apart, and dried in the sun for the manufacture. These laminæ were joined together horizontally and transversely, in sheets or leaves, upon a smooth board; then moistened with water, which dissolved a kind of viscous glue in the pores of the plant, serving to cement and render the whole uniform. The sheet being thus formed, was put into a press, and afterwards dried for use. Such was the process of making paper in Egypt: but as the sheets were coarse, brown, unequal, and imperfect, the Romans invented methods to bring the fabric to perfection. They contrived a glue or gum, by means of which they could occasionally enlarge the size and volume. They bleached it to a surprising degree of whiteness: they beat it with hammers, so as to render it more thin and less porous: they smoothed and polished it with ivory; and by a sort of calendar gave it a shining gloss like that of the Chinese paper. According to the different degrees of delicacy, whiteness, and size, it acquired different ap-

Par
Paradise.

pellations, either from the names of particular manufactures, from the great personages who used it, or from the particular uses to which it was put; such as the *Famian*, the *Leviathan*, the *Claudian*, the *Imperial*, the *Hieratic*, and the *Amphitheatric*.

PAR, in commerce, signifies any two things equal in value. See **EXCHANGE**.

PARABLE, a fable or allegorical instruction, founded on something real or apparent in nature or history, from which a moral is drawn by comparing it with something in which the people are more immediately concerned; such are the parables of Dives and Lazarus, of the Prodigal Son, of the Ten Virgins, &c.

PARABOLA. See **CONIC SECTIONS**.

PARABOLE. See **ORATORY**, n° 84.

PARACELSUS, (Aurelius Philip Theophrastus Bombastus de Hohenheim), a famous physician, born at Einsfelden, a town in the canton of Schwitz in Switzerland. He was educated with great care by his father, who was the natural son of a prince, and in a little time made a great progress in the study of physic. He afterwards travelled into France, Spain, Italy, and Germany, in order to become acquainted with the most celebrated physicians. At his return to Switzerland, he stopped at Bazil, where he read lectures on physic in the German tongue. He was one of the first who made use of chemical remedies with success, by which he acquired a very great reputation. Paracelsus gloried in destroying the method established by Galen, which he believed to be very uncertain; and by this means drew upon himself the hatred of the other physicians. It is said, that he boasted of being able by his remedies to preserve the life of man for several ages: but he himself experienced the vanity of his promises, by his dying at Saltzburg, in 1504, at 37 years of age, according to some, and at 48, according to others. The best edition of his works is that of Geneva in 1658, in 3 vols folio.

PARACENTESIS, an operation in surgery, commonly called *Tapping*. See **SURGERY**.

PARACLET, the **COMFORTER**, a name given to the Holy Ghost.

PARADE, in a military sense, the place where troops assemble or draw together to mount guard, or for any other purpose.

PARADES, in fencing, implies the action of parrying or turning off any thrust.

PARADISE, a term principally used for the garden of Eden, in which Adam and Eve were placed immediately upon their creation.

As to this terrestrial paradise, there have been many inquiries about its situation. It has been placed in the third heaven, in the orb of the moon, in the moon itself, in the middle region of the air, above the earth, under the earth, in the place possessed by the Caspian sea, and under the arctic pole. The learned Huetius places it upon the river that is produced by the conjunction of the Tigris and Euphrates, now called the *river of the Arabs*, between this conjunction and the division made by the same river before it falls into the Persian sea. Other geographers have placed it in Armenia, between the sources of the Tigris, the Euphrates, the Araxis, and the Phasis, which they suppose to be the four rivers described by Moses. But

Paradise. concerning the exact place we must necessarily be very uncertain, if indeed it can be thought at all to exist at present, considering the many changes which have taken place on the surface of the earth since the creation.

The celestial paradise is that place of pure and refined delight in which the souls of the blessed enjoy everlasting happiness.

Bird of PARADISE. See the following article.

See Plate CCXXXIII. PARADISEA, in ornithology, a genus of birds belonging to the order of picæ. The beak is covered with a belt or collar of downy feathers at the base; and the feathers on the sides are very long. The Portuguese first found these birds on the island of Gilolo, the Papua islands, and New Guinea; and they were known by the name of *birds of the sun*. The inhabitants of Ternate call them *manuco dewata*, the "bird of God;" whence the name *manuco diata*, used by some naturalists, is derived. According to some fabulous accounts, this bird has no legs, lives constantly on wing, and in the air; and, in confirmation of these accounts, the legs of all the dead birds offered to sale were cut off. But the inhabitants of Aroo, who resort yearly to Banda, undeceived the Dutch, and freed them from those prejudices. Another reason for cutting off the legs is, that the birds are more easily preserved without them; besides that the Moors wanted the birds without legs, in order to put them on in their mock-fights as ornaments to their helmets. The inhabitants of Aroo, however, have brought the birds with legs for 70 or 80 years; and Pijafetta, shipmate of Ferdinand Magellan, proved, about the year 1525, an eye-witness that these creatures were not without legs. However, the peculiar length and structure of their scapular feathers hinders them from settling, in high winds, on trees; and when they are thrown on the ground by these winds, they cannot rise again. If taken by the natives, they are immediately killed, as their food is not known; and they defend themselves with great courage with their formidable bills. There are reckoned six species of these birds.

1. The largest bird of Paradise is commonly two foot four inches in length; the head is small; the bill hard and long, of a pale colour. The head and back-part of the neck is lemon-coloured, a little black about the eyes; about the neck, the bird is of the brightest glossy emerald green, soft like velvet; as is also the breast, which is black: the wings are large, and chestnut-coloured; the back-part of the body is covered with long, straight, narrow feathers, of a pale brown colour, similar to the plumes of the ostrich. These feathers are spread when the bird is on the wing; for which reason he can keep very long in the air. On both sides of the belly are two tufts of stiff and shorter feathers, of a golden yellow, and shining. From the rump proceed two long stiff shafts, which are feathered on their extremities.

These birds are not found in Key, an island fifty Dutch miles east of Banda; but they are found at the Aroo islands, lying 15 Dutch miles farther east than Key, during the westerly or dry monsoon; and they return to New Guinea as soon as the easterly or wet monsoon sets in. They come always in a flock of 30 or 40, and are led by a bird which the inhabitants of Aroo call the *king*. This leader is black, with red spots; and constantly flies higher than

the rest of the flock, which never forsake him, but settle as soon as he settles: a circumstance that frequently proves their ruin when the king lights on the ground, whence they are not able to rise on account of the singular structure and disposition of their plumage. They are likewise unable to fly with the wind, which would ruin their loose plumage; but take their flight constantly against it, cautious not to venture out in hard blowing weather, as a strong wind frequently obliges them to come to the ground. During their flight they cry like starlings. Their note, however, approaches more to the creaking of ravens; which is heard very plainly, when they are in distress from a fresh gale blowing on the back of their plumage. In Aroo, these birds settle on the highest trees, especially on the ficus benjamina of the hortus malabaricus, commonly called the *swaringa tree*. The natives catch them with bird-lime or in nooses, or shoot them with blunt arrows; but though some are still alive when they fall into their hands, the catchers kill them immediately, and sometimes cut the legs off; then they draw out the entrails, dry and fumatize the bodies with sulphur or smoke only, and sell them at Banda for half a rixdollar each; but at Aroo they may be bought for a spike-nail or a piece of old iron. Flocks of these birds are often seen flying from one island to the other against the wind. In case they find the wind become too powerful, they fly straight up into the air, till they come to a place where it is less agitated, and then continue their flight. During the eastern monsoon their tails are moulted, so that they have them only during four months of the western monsoon.

2. The smaller bird of Paradise is about 20 inches long. His beak is lead-coloured, and paler at the point. The eyes are small, and inclosed in black about the neck. The head and back of the neck are of a dirty yellow; the back of a greyish yellow; the breast and belly of a dusky colour; the wings small, and chestnut-coloured. The long plumage is about a foot in length, and paler than in the large species; as in general the colours of this bird are less bright than the former. The two long feathers of the tail are constantly thrown away by the natives.—This is in all respects like the greater sort; and they likewise follow a king or leader, who is, however, blacker, with a purplish cast, and finer in colour than the rest. The neck and bill are larger in the male than in the female. They roost on the tops of the highest trees, and do not migrate like the other kind. Some say, that the birds of this species, finding themselves weak through age, soar straight towards the sun till they are tired, and fall dead to the ground. The natives draw the entrails, fear the birds with a hot iron, and put them in a tube of bamboo for preservation.

3. and 4. The large black bird of Paradise is brought without wings or legs for sale; so that no accurate description of it hath yet been given. Its figure, when stuffed, is narrow and round, but stretched in length to the extent of four spans. The plumage on the neck, head, and belly, is black and velvet-like, with a hue of purple and gold, which appears very strong. The bill is blackish, and one inch in length. On both sides are two bunches of feathers, which have the appearance of wings, although they

Paradisea. they are very different, the wings being cut off by the natives. This plumage is soft, broad, similar to peacocks feathers, with a glorious gloss and greenish blue, and all bent upwards; which Valentine thinks is occasioned by the birds being kept in hollow bamboo reeds. The feathers of the tail are of unequal length; those next to the belly are narrow, like hair; the two uppermost are much longer, and pointed; those immediately under them are a span and a half longer than the upper ones; they are stiff, on both sides fringed with a plumage like hair, black above, but glossy below. Birds of this kind are brought only from one particular place of New Guinea. Besides the large black bird of Paradise, there is still another sort, whose plumage is equal in length, but thinner in body, black above, and without any remarkable gloss, not having those shining peacock-feathers which are found on the greater species. This wants likewise the three long-pointed feathers of the tail belonging to the larger black species.

5. The white bird of Paradise is the most rare, and has two varieties; one quite white, and the other black and white. The former is very rare. The second has the fore-part black, and the back-part white; with 12 crooked wiry shafts, which are almost naked, tho', in some places, covered with hairs.

6. In the year 1689, a new species of the black bird of Paradise was seen in Amboyna. This was only one foot in length, with a fine purple hue, a small head, and a straight bill. On its back, near the wings, are feathers of a blue and purple colour, as on the other birds of paradise; but under the wings, and over all the belly, they are yellow-coloured, as in the common sort: on the back of the neck they are mouse-coloured mixed with green. It is remarkable in this species, that there are before the wings two roundish tufts of feathers, which are green-edged, and may be moved at pleasure by the bird, like wings. Instead of a tail, he has 12 or 13 black, naked, wire-like shafts, hanging promiscuously like feathers. His legs are strong, and have sharp claws. The head is remarkably small; and the eyes are also small, and surrounded with black.

7. The last species is the king's bird. This creature is about seven inches long, and somewhat larger than a titmouse. Its head and eyes are small; the bill straight; the eyes included in circles of black plumage; the crown of the head is flame-coloured; the back of the neck blood-coloured; the neck and breast of a chestnut colour, with a ring of the brightest emerald-green. Its wings are in proportion strong; and the quill-feathers dark, with red shining plumes, spots, and stripes. The tail is straight, short, and brown. Two long naked black shafts project from the rump, at least a hand-breadth beyond the tail; having at their extremities semilunar twisted plumage, of the most glaring green colour above, and dusky below. The belly is white and green sprinkled; and on each side is a tuft of long plumage, feathered with a broad margin, being on one side green, and on the other dusky. The back is blood-red and brown, shining like silk. The legs are in size like those of a lark, three fore-toes, and one back-toe. This bird associates not with any of the other birds of paradise; but sits solitary from bush to bush, wherever he sees

red berries, without ever getting on tall trees.

PARADOX, in philosophy, a proposition seemingly absurd, as being contrary to some received opinions, but yet true in fact.

No science abounds more with paradoxes than geometry: thus, that a right line should continually approach to the hyperbola, and yet never reach it, is a true paradox; and in the same manner a spiral may continually approach to a point, and yet not reach it in any number of revolutions, however great.

PARAGOGE, in grammar, a figure whereby a letter or syllable is added to the end of a word; as *med*, for *me*; *dicier*, for *dici*, &c.

PARAGRAPH, in general, denotes a section or division of a chapter; and in references is marked thus, ¶.

PARAGUAY, or LA PLATA, a province of Spanish America, bounded on the north by the river of the Amazons; on the east, by Brazil; on the south, by Patagonia; and on the west, by Chili. This country was first discovered by Sebastian Cabot, who, in 1526, passed from Rio de la Plata to the river Parana in small barks, and thence entered the river called *Paraguay*. It was not, however, thoroughly reduced till the Jesuits obtained possession of it. A few of these went to Paraguay, soon after the city of Assumption was founded, and converted about 50 Indian families, who soon induced many others to follow their example, on account of the peace and tranquillity they enjoyed under the fathers. They had long reformed the Spaniards and Portuguese; but the Jesuits, by learning their language, conforming to their manners, &c. soon acquired great authority among them; till at last, by steadily pursuing the same artful measures, they arrived at the highest degree of power and influence, being in a manner the absolute sovereigns of a great part of this extensive country; for above 350,000 families are said to have been subject to them, living in obedience and awe bordering on adoration, yet procured without the least violence or constraint. There were above 60,000 parishes on the banks of the rivers Paraguay and Parana, not exceeding the distance of 30 miles from each other: in each of these there was a Jesuit, supreme in all causes, civil, military, and ecclesiastic, who might be regarded as a petty prince, governing not only with the sway of a sovereign, but with the influence and reputation of an oracle. He nominated the chiefs in all the different departments: the cacique held of him; the general received his commission and instructions from him; and all his decisions were without appeal. The same reverend father who presided over the civil economy, assisted by two others, performed also the duties of a parish-priest; catechizing the Indians, saying mass, exhorting, marrying, imposing penance, visiting the sick, &c.

The above was the account given of the behaviour of the Jesuits by their own writers. Others, however, treated their characters with more severity; accusing them of pride, haughtiness, and abusing their authority to the greatest degree; inasmuch that they would have caused the magistrates to be whipped in their presence, and obliged persons of the highest distinction within their jurisdiction to kiss the hem of their garment, as the greatest honour at which they could possibly arrive. To this might be added, the utter abo-

Paradox
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Paraguay.

Paralipomena
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Parallactic.

lition of all ideas of property; which indeed was rendered useless by the general magazines and store-houses which they established, and from which, together with the herds of cattle kept for the public use, they supplied the want of individuals as occasion required; yet still it was objected to the character of the fraternity, that they possessed large property themselves, and claimed the absolute disposal of the meanest effects in Paraguay. All manufactures belonged to them; every natural commodity was brought to them; and the treasures annually remitted to the superior of the order were thought to be a proof that zeal for religion was not the only motive by which they were influenced.

Besides the parochial or provincial governments, there was a kind of supreme council, composed of an annual meeting of all the fathers, who concerted the measures necessary for promoting the common concerns of the mission, framed new laws, corrected or abolished old ones, and, in a word, adapted every thing to circumstances. It is said to have been one of the great objects of the annual councils to take such measures as should effectually deprive strangers of all intelligence concerning the state of the mission. Hence the natives were restrained from learning the Spanish tongue, and were taught, that it was dangerous for their salvation to hold any conversation with a subject of Spain or Portugal. But the circumstance that rendered their designs most suspicious, was the establishment of a military force. Every parish had its corps of horse and foot, who were duly exercised every Sunday; and it was said, that the whole amounted to a body of 70,000 or 80,000 troops, well disciplined.—Such was the state of this country some time ago; but as to its situation since the abolition of the sect of Jesuits, we can say nothing, as very little authentic intelligence is permitted to pass from that country to this.

The climate of Paraguay is very little different from that of Spain; and the distinctions between the seasons are much the same. In winter indeed, violent tempests of wind and rain are very frequent, accompanied with such dreadful claps of thunder and lightning as fill the inhabitants, though used to them, with terror and consternation. In summer, the excessive heats are mitigated by gentle breezes, which constantly begin at eight or nine in the morning.

The soil is very fertile, producing maize, manioc, and potatoes, besides many fruits and simples unknown in Europe. Vines, however, do not thrive, except in some particular places. Wheat has also been tried; but it is only used for cakes, and other things of that kind. There are great numbers of poisonous serpents, and others of an enormous size, many of which live on fish. Almost every forest of the country abounds with bees, which make their hives in hollow trees. The country produces also cotton, hemp, and flax; and there are such numbers of wild cattle, that they are killed only for their hides. The natives differ not much from those described under the article AMERICA.

PARALIPOMENA, in matters of literature, denotes a supplement of things omitted in a preceding work.

PARALEPSIS. See ORATORY, n° 87.

PARALLACTIC, in general, something relating to the parallax of heavenly bodies. See PARALLAX.

PARALLAX, in astronomy. See there, n° 182, &c.

PARALLEL, in geometry, an appellation given to lines, surfaces, and bodies every where equidistant from each other. See GEOMETRY.

PARALLEL Sphere, that situation of the sphere where-in the equator coincides with the horizon, and the poles with the zenith and nadir.

PARALLEL Sailing. See NAVIGATION, sect. iii.

PARALLELS of Latitude, in astronomy, are lesser circles of the sphere parallel to the ecliptic, imagined to pass through every degree and minute of the co-lures.

PARALLELS of Altitude, or *Almucantars*, are circles parallel to the horizon, imagined to pass through every degree and minute of the meridian between the horizon and zenith, having their poles in the zenith.

PARALLELS of Declination, in astronomy, are the same with parallels of latitude in geography.

PARALLELOPIPED, in geometry, a regular solid comprehended under six parallelograms, the opposite ones whereof are similar, parallel, and equal to each other.

PARALLELOPIPEDIA, in natural history, a genus of spars, externally of a determinate and regular figure, always found loose, detached, and separate from all other bodies, and in form of an oblique parallelo-piped, with six parallelogram sides and eight solid angles; easily fissile either in an horizontal or perpendicular direction; being composed of numbers of thin plates, and those very elegantly and regularly arranged bodies, each of the same form with the whole mass, except that they are thinner in proportion to their horizontal planes, and naturally fall into these and no other figures, on being broken with a slight blow.

PARALOGISM, in logic, a false reasoning, or a fault committed in demonstration, when a consequence is drawn from principles that are false; or, though true, are not proved; or when a proposition is passed over that should have been proved by the way.

PARALYSIS, the Palsy. See MEDICINE, n° 376.

PARAMECIA, in natural history, a name given to such animalcules as have no visible limbs or tails, and are of an irregularly oblong figure.

PARAMOUNT, (compounded of two French words, *par*, i. e. *per*, and *monter* *ascendere*), signifies in our law the "highest lord of the fee, of lands, tenements, and hereditaments." As there may be a lord meane where lands are held of an inferior lord, who holds them of a superior under certain services; so this superior lord is lord *paramount*. Also the king is the chief lord, or lord *paramount* of all the lands in the kingdom. *Co. Litt. 1.*

PARANYMPH, among the ancients, the person who waited on the bridegroom, and directed the nuptial solemnities; called also *pronubus* and *auspex*, because the ceremonies began by taking auspicia. As the paranymphe officiated only on the part of the bridegroom, a woman called *pronuba* officiated on the part of the bride.

PARAPET, in fortification, an elevation of earth designed for covering the soldiers from the enemy's cannon or small-shot. See FORTIFICATION.

PARAPHERNALIA, or PARAPHERNA, in the civil law, those goods which a wife brings her husband besides

Parallax
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Paraphernalia.

Paraphimosis
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Parbuncle.

Parche,
Parchment.

besides her dower, and which are still to remain at her disposal exclusive of her husband, unless there are some provision made to the contrary in the marriage-contract. Some of our English civilians define the paraphernalia to be such goods as a wife challengeth over and above her dower or jointure, after her husband's death; as furniture for her chamber, wearing apparel, and jewels, which are not to be put into the inventory of her husband's goods; and a French civilian calls paraphernalia the moveables, linen, and other female necessaries, which are adjudged to a wife in prejudice of the creditors, when she renounces the succession of her husband.

PARAPHIMOSIS, a disorder of the penis, wherein the prepuce is shrunk, and withdrawn behind the glans, so as not to be capable of being brought to cover the same; which generally happens in venereal disorders. See **SURGERY**.

PARAPHRASE, an explanation of some text in clearer and more ample terms, whereby is supplied what the author might have said or thought on the subject. Such are esteemed Erasmus's paraphrase on the New Testament, the Chaldee Paraphrase on the Pentateuch, &c.

PARAPHRENITIS, an inflammation of the diaphragm. See **MEDICINE**, n° 290.

PARAPHROSIS, a word used by medical writers to denote a delirium, or an alienation of mind in fevers, or from whatever other cause.

PARAPLEGIA, a species of palsy. See **MEDICINE**, n° 379.

PARASANG, an ancient Persian measure, different at different times, and in different places; being usually 30, sometimes 40, and sometimes 50 stadia, or furlongs.—The word, according to Littleton, has its rise from *parasch angarius*, *q. d.* the space a post-man rides from one station, *angaria*, to another.

PARASELENE, in natural philosophy, a mock moon; a meteor or phenomenon encompassing or adjacent to the moon, in form of a luminous ring; wherein are observed sometimes one, and sometimes two or more images of the moon.

PARASITE, among the Greeks, was originally a very reputable title; the parasites being a kind of priests, at least ministers, of the gods, in the same manner as the epulones were at Rome. They took care of the sacred corn, or the corn destined for the service of the temples and the gods, *viz.* sacrifices, feasts, &c. They had even the intendance over sacrifices; and took care that they were duly performed. At Athens there was a kind of college of 12 parasites; each people of Attica furnishing one, who was always chosen out of the best families. Polybius adds, that a parasite was also an honourable title among the ancient Gauls, and was given to their poets. But of late it has been made a term of reproach, and used for a flatterer or mean dependent.

PARASITES, or **PARASITICAL Plants**, in botany, such plants as are produced out of the trunk or branches of other plants, from whence they receive their nourishment, and will not grow on the ground. Such are the mistletoe, &c.

PARASTATE, in anatomy. See **PROSTATE**.

PARBUNCLE, in a ship, the name of a rope al-

most like a pair of slings: it is seized both ends together, and then put almost double about any heavy thing that is to be hoisted in or out of the ship; having the hook of the runner latched into it, to hoist it up by.

PARCÆ, in heathen mythology, goddesses who were supposed to preside over the accidents and events, and to determine the date or period of human life.

The Parcæ were three, Clotho, Lachesis, and Atropos; because, forsooth, all things have their beginning, progress, and end. Hence the poets tell us, the Parcæ spun the thread of men's lives; that Clotho held the distaff, and drew the thread; Lachesis twirled the spindle, and spun it; and Atropos cut it. *Clotho column retinct, Lachesis net, Atropos occut.*

The ancients represent the Parcæ divers ways: Lucian, in the shape of three poor old women, having large locks of wool, mixed with distaffs on their heads; one of which holds a distaff, the other a wheel, and the third a pair of scissors, wherewith to cut the thread of life.—Others represent them otherwise: Clotho appearing in a long robe of divers colours, wearing a crown upon her head adorned with seven flares, and holding a distaff in her hand; Lachesis in a robe beset with flares, with several spindles in her hand; and Atropos, clad in black, cutting the thread with a pair of large scissors.

The ancients imagined that the Parcæ used white wool for a long and happy life, and black for a short and unfortunate one.

PARCHMENT, the skins of sheep or goats prepared after such a manner as to render it proper for writing upon, covering books, &c.

The word comes from the Latin *pergamena*, the ancient name of this manufacture; which is said to have been taken from the city Pergamos, to Eumenes, king whereof, its invention is usually ascribed; tho', in reality, that prince appears rather to have been the improver, than the inventor of parchment. For the Persians of old, according to Diodorus, wrote all their records on skins; and the ancient Ionians, as we are told by Herodotus, made use of sheep-skins and goat-skins in writing, many ages before Eumenes's time. Nor need we doubt that such skins were prepared and dressed for that purpose, after a manner not unlike that of our parchment; tho' probably not so artificially.—The manufacture of parchment is begun by the skinner, and finished by the parchment-maker.

The skin having been stripped of its wool, and placed in the lime-pit, in the manner described under the article SHAMMY, the skinner stretches it on a kind of frame, and parcs off the flesh with an iron instrument; this done, it is moistened with a rpg; and powdered chalk being spread over it, the skinner takes a large pumice-stone, flat at bottom, and rubs over the skin, and thus scowers off the flesh; he then goes over it again with the iron instrument, moistens it as before, and rubs it again with the pumice-stone without any chalk underneath: this smooths and softens the flesh-side very considerably. He then drains it again, by passing over it the iron instrument as before. The flesh-side being thus drained, by scraping off the moisture, he in the same manner passes the iron over the wool or hair-side: then stretches it tight on a frame, and scrapes the flesh-side again: this finishes its draining; and the

more

more it is drained, the whiter it becomes. The skinner now throws on more chalk, sweeping it over with a piece of lamb-skin that has the wool on; and this smooths it still farther. It is now left to dry, and when dried, taken off the frame by cutting it all round. The skin thus far prepared by the skinner, is taken out of his hands by the parchment-maker, who first, while it is dry, pares it on a summer, (which is a calf skin stretched in a frame), with a sharper instrument than that used by the skinner; and working with the arm from the top to the bottom of the skin, takes away about one half of its thickness. The skin thus equally pared on the flesh-side, is again rendered smooth, by being rubbed with the pumice-stone, on a bench covered with a sack stuffed with flacks; which leaves the parchment in a condition fit for writing upon. The parings thus taken off the leather, are used in making glue, size, &c. See the article GLUE, &c.

What is called *vellum*, is only parchment made of the skins of abortives, or at least sucking calves. This has a much finer grain, and is whiter and smoother than parchment; but is prepared in the same manner, except its not being passed through the lime-pit.

PARDIES (Ignatius Gaston), an ingenious and learned French Jesuit, born at Paris in 1636. He taught polite literature for several years; during which time he composed several small pieces, both in prose and verse, with peculiar delicacy of thought and style. At length he devoted himself entirely to mathematics and natural philosophy, and read all authors, ancient as well as modern, in those branches of knowledge. He died in 1673, of an infectious disorder contracted by confessing and preaching to the prisoners in the Bicetre during the Easter holidays. Father Pardies published several works; of which his *Elements of Geometry* are well known in this country, where a translation of them has gone thro' several editions. In 1672 he had a dispute with Sir Isaac Newton respecting his *Theory of Light and Colours*; which may be seen in the *Philosophical Transactions* for that year.

PARDALIS, in natural history. See **LEO**.

PARDON, in criminal law, is the remitting or forgiving an offence committed against the king.

Reccaria on
Crimes and
Punishments

Laws (says an able writer), cannot be framed on principles of compassion to guilt; yet justice, by the constitution of England, is bound to be administered in mercy: this is promised by the king in his coronation oath; and it is that act of his government which is the most personal and most entirely his own. The king condemns no man; that rugged task he leaves to his courts of justice: the great operation of his sceptre is mercy. His power of pardoning was said by our Saxon ancestors to be derived *à lege sue dignitatis*; and it is declared in parliament, by stat. 27 Hen. VIII. c. 24. that no other person hath power to pardon or remit any treason or felonies whatsoever; but that the king hath the whole and sole power thereof, united and knit to the imperial crown of this realm.

This is indeed one of the great advantages of monarchy in general above any other form of government, that there is a magistrate who has it in his power to extend mercy wherever he thinks it is deserved; holding a court of equity in his own breast, to soften the rigour of the general law, in such criminal cases as merit an exemption from punishment. Pardons

(according to some theorists) should be excluded in a perfect legislation, where punishments are mild; but certain; for that the clemency of the prince seems a tacit disapprobation of the laws. But the exclusion of pardons must necessarily introduce a very dangerous power in the judge or jury; that of constraining the criminal law by the spirit instead of the letter: or else it must be holden, what no man will seriously avow, that the situation and circumstances of the offender (though they alter not the essence of the crime) ought to make no distinction in the punishment. In democracies, however, this power of pardon can never subvert; for there nothing higher is acknowledged than the magistrate who administers the laws: and it would be impolitic for the power of judging and of pardoning to centre in one and the same person. This (as the president Montequien observes) would oblige him very often to contradict himself, to make and to unmake his decisions: it would tend to confound all ideas of right among the mass of people; as they would find it difficult to tell, whether a prisoner were discharged by his innocence, or obtained a pardon through favour. In Holland therefore, if there be no stadtholder, there is no power of pardoning lodged in any other member of the state. But in monarchies the king acts in a superior sphere; and though he regulates the whole government: as the first mover, yet he does not appear in any of the disagreeable or invidious parts of it. Whenever the nation see him personally engaged, it is only in works of legislation, magnificence, or compassion. To him therefore the people look up as the fountain of nothing but bounty and grace; and these repeated acts of goodness, coming immediately from his own hand, endear the sovereign to his subjects, and contribute more than any thing to root in their hearts that filial affection and personal loyalty which are the sure establishment of a prince.

The king may pardon all offences merely against the crown or the public; excepting, 1. That, to preserve the liberty of the subject, the committing any man to prison out of the realm, is by the *habeas corpus* act, 31 Car. II. c. 2. made a *premunire*, unpardonable even by the king. Nor, 2. can the king pardon, where private justice is principally concerned in the prosecution of offenders: *Non potest rex gratiam facere cum injuria et damno aliorum*. Therefore, in appeals of all kinds, (which are the suit, not of the king, but of the party injured), the prosecutor may release; but the king cannot pardon. Neither can he pardon a common nuisance, while it remains undressed, or so as to prevent an abatement of it; though afterwards he may remit the fine: because though the prosecution is vested in the king to avoid the multiplicity of suits, yet (during its continuance) this offence favours more of the nature of a *private* injury to each individual in the neighbourhood, than of a *public* wrong. Neither, lastly, can the king pardon an offence against a popular or penal statute, after information brought; for thereby the informer hath acquired a private property in his part of the penalty.

There is also a restriction of a peculiar nature, that affects the prerogative of pardoning, in case of parliamentary impeachments, viz. that the king's pardon cannot be pleaded to any such impeachment, so as to impede the inquiry, and stop the prosecution of great and

Paregories and notorious offenders. Therefore when, in the reign of Charles the second, the earl of Danby was impeached by the house of commons of high treason and other misdemeanors, and pleaded the king's pardon in bar of the same, the commons alleged, "That there was no precedent that ever any pardon was granted to any person impeached by the commons of high treason, or other high crimes, depending the impeachment;" and thereupon resolved, "That the pardon so pleaded was illegal and void, and ought not to be allowed in bar of the impeachment of the commons of England;" for which resolution they assigned this reason to the house of lords, "That the setting up a pardon to be a bar of an impeachment defeats the whole use and effect of impeachments: for should this point be admitted, or stand doubted, it would totally discourage the exhibiting any for the future; whereby the chief institution for the preservation of the government would be destroyed." Soon after the Revolution, the commons renewed the same claim, and voted, "That a pardon is not pleadable in bar of an impeachment." And at length, it was enacted by the act of settlement, 12 & 13 W. III. c. 2. "That no pardon under the great seal of England shall be pleadable to an impeachment by the commons in parliament." But, after the impeachment has been solemnly heard and determined, it is not understood that the king's royal grace is farther restrained or abridged: for, after the impeachment and attainder of the six rebel lords in 1715, three of them were from time to time reprieved by the crown; and at length received the benefit of the king's most gracious pardon.

The effect of such pardon by the king, is to make the offender a new man; to acquit him of all corporal penalties and forfeitures annexed to that offence for which he obtains his pardon; and not so much to restore his former, as to give him a new credit and capacity. But nothing can restore or purify the blood when once corrupted, if the pardon be not allowed till after attainder, but the high and transcendent power of parliament. Yet if a person attainted receives the king's pardon, and afterwards hath a son, that son may be heir to his father; because the father being made a new man, might transmit new inheritable blood; though, had he been born before the pardon, he could never have inherited at all.

PARAGORIES, in pharmacy, medicines that affuage pain, otherwise called **ANODYNES**.

FAREIRA FRAYA, in the materia medica, a kind of oblong and large root brought from the Brasils.—It is certainly a diuretic of no mean character, and has done great service in nephritic cafes. In pleuritis and quinries, it has been attended with more success than almost any medicine we know of singly.

PARALELON, in grammar, a figure by which a word or syllable is added to the end of another.

PAREMBOLE, in rhetoric, a figure wherein something relating to the subject is inserted in the middle of a period. All the differences between the parembol and parenthesis, according to Vossius, is, that the former relates to the subject in hand, whereas the latter is foreign to it.

PARENCHYMA, in anatomy, a term introduced by Erasistratus, signifying all that substance which is

contained in the interstices betwixt the blood-vessels of the viscera, which he imagined to be extravasated and concentered blood.

PARENCHYMA of Plants. Grew applies the term *parenchyma* to the pith or pulp, or that inner part of a fruit or plant through which the juice is supposed to be distributed. See **PLANTS**.

PARENT, a term of relation applicable to those from whom we immediately derive our being. See **MORAL PHILOSOPHY**, n° 122, 132.—135.

To this article belongs an inquiry into, 1. The legal duties of parents to their legitimate children. 2. Their power over them.

1. The duties of parents to legitimate children consist in three particulars; their *maintenance*, their *protection*, and their *education*.

1. The duty of parents to provide for the *maintenance* of their children, is a principle of natural law; an obligation, says Puffendorf, laid on them not only by nature herself, but by their own proper act, in bringing them into the world; for they would be in the highest manner injurious to their issue, if they only gave their children life, that they might afterwards see them perish. By begetting them, therefore, they have entered into a voluntary obligation, to endeavour, as far as in them lies, that the life which they have bestowed shall be supported and preserved. And thus the children will have a perfect right of receiving maintenance from their parents. And the president Montesquieu has a very just observation upon this head, that the establishment of marriage, in all civilized states, is built on this natural obligation of the father to provide for his children; for that ascertains and makes known the person who is bound to fulfil this obligation; whereas, in promiscuous and illicit conjunctions, the father is unknown; and the mother finds a thousand obstacles in her way; shame, remorse, the constraint of her sex, and the rigour of laws, that stifle her inclinations to perform this duty; and besides, she generally wants ability.

The municipal laws of all well-regulated states have taken care to enforce this duty: though providence has done it more effectually than any laws, by implanting in the breast of every parent that natural *affection*, or insuperable degree of affection, which not even the deformity of person or mind, not even the wickedness, ingratitude, and rebellion of children, can totally suppress or extinguish.

The civil law obliges the parent to provide maintenance for his child; and if he refuses, *judex de ea re cognoscet*. Nay, it carries this matter so far, that it will not suffer a parent at his death totally to disinherit his child, without expressly giving his reason for so doing; and there are 14 such reasons reckoned up, which may justify such disinherison. If the parent alleged no reason, or a bad, or a false one, the child might set the will aside, *tangquam testamentum inefficacium*, a testament contrary to the natural duty of the parent. And it is remarkable under what colour the children were to move for relief in such a case; by suggesting, that the parent had lost the use of his reason when he made the *inefficacious* testament. And this, as Puffendorf observes, was not to bring into dispute the testator's power of disinheriting his own offspring; but to examine the motives upon which he did it; and if they

Paren-
chyma,
Parent.

Black?
Comment.

they were found defective in reason, then to set them aside. But perhaps this is going rather too far: every man has, or ought to have, by the laws of society, a power over his own property: and, as Grotius very well distinguishes, natural right obliges to give a *necessary* maintenance to children; but what is more than that they have no right to, than as it is given by the favour of their parents, or the positive constitutions of the municipal law.

Let us next see what provision our own laws have made for this natural duty. It is a principle of law, that there is an obligation on every man to provide for those descended from his loins; and the manner in which this obligation shall be performed, is thus pointed out. The father and mother, grandfather and grandmother of poor impotent persons shall maintain them at their own charges, if of sufficient ability, according as the quarter-sessions shall direct; and, if a parent runs away, and leaves his children, the churchwardens and overseers of the parish shall seize his rents, goods, and chattels, and dispose of them toward their relief. By the interpretations which the courts of law have made upon these statutes, if a mother or grandmother marries again, and was before full second marriage of sufficient ability to keep the child, the husband shall be charged to maintain it; for this being a debt of her's, when single, shall, like others, extend to charge the husband. But, at her death, the relation being dissolved, the husband is under no farther obligation.

No person is bound to provide a maintenance for his issue, unless where the children are impotent and unable to work, either through infancy, disease, or accident; and then is only obliged to find them with necessaries, the penalty on refusal being no more than 20 s. a-month. For the policy of our laws, which are ever watchful to promote industry, did not mean to compel a father to maintain his idle and lazy children in ease and indolence; but thought it unjust to oblige the parent, against his will, to provide them with superfluities, and other indulgences of fortune; imagining they might trust to the impulse of nature, if the children were deserving of such favours. Yet, as nothing is so apt to stifle the calls of nature as religious bigotry, it is enacted, that if any Popish parent shall refuse to allow his Protestant child a fitting maintenance, with a view to compel him to change his religion, the lord chancellor shall by order of court constrain him to do what is just and reasonable. But this did not extend to persons of another religion, of no less bitterness and bigotry than the Popish; and therefore, in the very next year, we find an instance of a Jew of immense riches, whose only daughter having embraced Christianity, he turned her out of doors; and on her application for relief, it was held she was entitled to none. But this gave occasion to another statute, which ordains, that if Jewish parents refuse to allow their Protestant children a fitting maintenance, suitable to the fortune of the parent, the lord chancellor, on complaint, may make such order therein as he shall see proper.

Our law has made no provision to prevent the disinheriting of children by will; leaving every man's property in his own disposal, upon a principle of liberty in this as well as every other action; though perhaps it had not been amiss if the parent had been bound

to leave them at the least a necessary subsistence. Indeed, among persons of any rank or fortune, a competence is generally provided for younger children, and the bulk of the estate settled upon the eldest by the marriage-articled. Heirs also, and children, are favourites of our courts of justice, and cannot be disinherited by any dubious or ambiguous words; there being required the utmost certainty of the testator's intentions to take away the right of an heir.

2. From the duty of maintenance we may easily pass to that of *protection*; which is also a natural duty, but rather permitted than enjoined by any municipal laws; nature, in this respect, working so strongly as to need rather a check than a spur. A parent may, by our laws, maintain and uphold his children in their law-suits, without being guilty of the legal crime of maintaining quarrels. A parent may also justify an assault and battery in defence of the persons of his children; nay, where a man's son was beaten by another boy, and the father went near a mile to find him, and there revenged his son's quarrel by beating the other boy, of which beating he afterwards unfortunately died; it was not held to be murder, but manslaughter merely. Such indulgence does the law shew to the frailty of human nature, and the workings of parental affection.

3. The last duty of parents to their children is that of giving them an *education* suitable to their station in life: a duty pointed out by reason, and of far the greatest importance of any. For, as Puffendorff very well observes, it is not easy to imagine or allow, that a parent has conferred any considerable benefit upon his child by bringing him into the world, if he afterwards entirely neglects his culture and education, and suffers him to grow up like a mere beast, to lead a life useless to others, and shameful to himself. Yet the municipal laws of most countries seem to be defective in this point, by not confining the parent to bestow a proper education upon his children. Perhaps they thought it punishment enough to leave the parent, who neglects the instruction of his family, to labour under those griefs and inconveniences which his family, so uninstructed, will be sure to bring upon him. Our laws, though their defects in this particular cannot be denied, have in one instance made a wise provision for breeding up the rising generation; since the poor and laborious part of the community, when past the age of nurture, are taken out of the hands of their parents, by the statutes for apprenticing poor children; and are placed out by the public in such a manner as may render their abilities, in their several stations, of the greatest advantage to the commonwealth. The rich indeed are left at their own option, whether they will breed up their children to be ornaments or disgraces to their family. Yet in one case, that of religion, they are under peculiar restrictions: for it is provided, that if any person sends any child under his government beyond the seas, either to prevent its good education in England, or in order to enter into, or reside in, any Popish college, or to be instructed, persuaded, or strengthened in the Popish religion; in such case, besides the disabilities incurred by the child so sent, the parent or person sending shall forfeit 100 l. which shall go to the sole use and benefit of him that shall discover the offence. And if any parent, or other, shall send

Parent. or convey any person beyond sea, to enter into, or be resident in, or trained up in, any priory, abbey, nunnery, Popish university, college, or school, or house of Jesuits or priests, or in any private Popish family, in order to be instructed, persuaded, or confirmed, in the Popish religion; or shall contribute any thing towards their maintenance when abroad by any pretext whatever, the person both sending and sent shall be disabled to sue in law or equity, or to be executor or administrator to any person, or to enjoy any legacy or deed of gift, or to bear any office in the realm, and shall forfeit all his goods and chattels, and likewise all his real estate for life.

II. The power of parents over their children is derived from the former consideration, their *duty*: this authority being given them, partly to enable the parent more effectually to perform his duty, and partly as a recompence for his care and trouble in the faithful discharge of it. And upon this score the municipal laws of some nations have given a much larger authority to the parents than others. The ancient Roman laws gave the father a power of life and death over his children; upon this principle, that he who gave had also the power of taking away. But the rigour of these laws was softened by subsequent constitutions; so that we find a father banished by the emperor Hadrian for killing his son, though he had committed a very heinous crime, upon this maxim, that *patria potestas in pietate debet, non in atrocitate, consistere*. But still they maintained to the last a very large and absolute authority: for a son could not acquire any property of his own during the life of his father; but all his acquisitions belonged to the father, or at least the profits of them, for his life.

The power of a parent by our English law is much more moderate; but still sufficient to keep the child in order and obedience. He may lawfully correct his child, being under age, in a reasonable manner; for this is for the benefit of his education. The consent or concurrence of the parent to the marriage of his child under age, was also directed by our ancient law to be obtained: but now it is absolutely necessary; for without it the contract is void. And this also is another means which the law has put into the parent's hands, in order the better to discharge his duty; first, of protecting his children from the snares of artful and designing persons; and next, of settling them properly in life, by preventing the ill consequences of too early and precipitate marriages. A father has no other power over his son's estate, than as his trustee or guardian; for though he may receive the profits during the child's minority, yet he must account for them when he comes of age. He may indeed have the benefit of his children's labour while they live with him, and are maintained by him; but this is no more than he is entitled to from his apprentices or servants. The legal power of a father, (for a mother, as such, is entitled to no power, but only to reverence and respect), the power of a father, we say, over the persons of his children ceases at the age of 21; for they are then enfranchised by arriving at years of discretion, or that point which the law has established (as some must necessarily be established) when the empire of the father, or other guardian, gives place to the empire of reason. Yet, till that age arrives, this empire of the father

continues even after his death; for he may by his will appoint a guardian to his children. He may also delegate part of his parental authority, during his life, to the tutor or schoolmaster of his child; who is then *in loco parentis*, and has such a portion of the power of the parent committed to his charge, viz. that of restraint and correction, as may be necessary to answer the purposes for which he is employed. See CHILDREN.

PARENTALIA, in antiquity, funeral obsequies, or the last duties paid by children to their deceased parents.

PARENTHESIS, in grammar, certain intercalary words inserted in a discourse, which interrupt the sense or thread, but seem necessary for the better understanding of the subject.

PARENZO, a small but strong town of Italy, and in Istria, with a bishop's see and a good harbour; situated on the gulph of Venice, in E. Long. 13. 46. N. Lat. 39. 28. It submitted to the Venetians in 1267.

PAREISIS, in medicine, a palsy of the bladder, wherein the urine is either suppressed or discharged involuntarily.

PARETONIUM, in natural history, the name of an earth found on the shores of Egypt, Cyrene, and the island of Crete, used by the ancients in painting.

PARGET, in natural history, a name given to several kinds of gypsum, or plaster-stone.

PARGETING, in building, is used for the plastering of walls, and sometimes for plaster itself.

PARHELION, or **PARHELIUM**, in natural philosophy, a mock-sun or meteor, in form of a very bright light, appearing on one side of the sun.

Appearances of this kind have been made mention of both by the ancients and moderns. Aristotle observes, that in general they are seen only when the sun is near the horizon, though he takes notice of two that were seen in Bosphorus from morning to evening; and Pliny has related the times when such phenomena were observed at Rome. Gassendi says, that, in 1635 and 1636, he often saw one mock-sun. Two were observed by M. de la Hire in 1689; and the same number by Cassini in 1693, Mr Grey in 1700, and Dr Halley in 1702: but the most celebrated appearances of this kind were seen at Rome by Scheiner, by Muschebroeck at Utrecht, and by Hevelius at Sedan. By the two former, four mock-suns were observed, and by the latter seven.

Parhelia are apparently of the same size with the sun, though not always of the same brightness, nor even of the same shape; and when a number appear at once, there is some difference in both these respects among them. Externally, they are tinged with colours like the rainbow; and many have a long fiery tail opposite to the sun, but paler towards the extremity. Parhelia are generally accompanied with coronas, some of which are tinged with rainbow-colours, but others are white. They differ in number and size; but all agree in breadth, which is that of the apparent diameter of the sun.

A very large white circle, parallel to the horizon, generally passes through all the parhelia; and, if it were entire, it would go through the centre of the sun. Sometimes there are arcs of lesser circles concentric to this, touching those coloured circles which

Parentalia
Parhelion.

Parhelion. furround the sun. They are also tinged with colours, and contain other parhelia. There are also said to have been other circles obliquely situated with respect to all those we have mentioned; but of this we have met with no authentic account. The order of the colours in these circles is the same as in the rainbow; but on the inside, with respect to the sun, they are red, as is also observed in many other corona's.

Parhelia have been visible for 1, 2, 3, and 4 hours together; and in North America they are said to continue some days, and to be visible from sun-rise to sun-set.

When the parhelia disappear, it sometimes rains, or there falls snow in the form of oblong spiculae, as Maraldi, Weidler, Krafft, and others, have observed; and because the air in North America abounds with such frozen spiculae, which are even visible to the eye, according to Ellis and Middleton, such particles have been thought to be the cause of all corona's and parhelia.

Mr Wales says, that, at Churchill in Hudson's Bay, the rising of the sun is always preceded by two long streams of red light, one on each side of him, and about 20° distant from him. These rise as the sun rises; and as they grow longer begin to bend towards each other, till they meet directly over the sun, just as he rises, forming there a kind of parhelion or mock-sun. These two streams of light, he says, seem to have their source in two other parhelia, which rise with the true sun; and in the winter-season, when the sun never rises above the haze or fog, which he says is constantly found near the horizon, all these accompany him the whole day, and set with him in the same manner as they rise. Once or twice he saw a fourth parhelion directly under the true sun; but this, he says, is not common. These facts being constant, are very valuable, and may throw great light on the theory of these remarkable phenomena.

Sometimes parhelia appear in a different manner; as when three suns have been seen in the same vertical circle, well defined, and touching one another. The true sun was in the middle, and the lowest touched the horizon; and they set one after the other. This appearance was seen by M. Malezew in 1722. Other appearances similar to this are recited by M. Muschenbroeck.

Sometimes the sun has risen or set with a luminous tail projecting from him, of the same breadth with his diameter, and perpendicular to the horizon. Such an appearance was seen by Cassini in 1672 and 1692, by de la Hire in 1702, and by Mr Ellis in Hudson's Bay.

As M. Feuillée was walking on the banks of the river La Plata, he saw the sun rising over the river with a luminous tail projecting downwards, which continued till he was six degrees high.

Paraselenæ, or mock-moons, have also been seen, accompanied with tails and coloured circles, like those which accompany the parhelia. An account of several, and a particular description of a fine appearance of this kind, may be seen in Muschenbroeck.

The Roman phenomenon, observed by Scheiner, is famous on account of its having been the first appearance of the kind that engaged the attention of philosophers. It is represented in fig. 4; in which A is the place of the observer; B his zenith, C the true

sun, AB a plane passing through the observer's eye, the true sun, and the zenith. About the sun C, there appeared two concentric rings, not complete, but diversified with colours. The lesser of them, DEF, was fuller, and more perfect; and though it was open from D to F, yet those ends were perpetually endeavouring to unite; and sometimes they did so. The outer of these rings was much fainter, so as scarcely to be discernible. It had, however, a variety of colours; but was very inconstant. The third circle, KLMN, was very large, and all over white, passing through the middle of the sun, and every where parallel to the horizon. At first this circle was entire; but towards the end of the appearance it was weak and ragged, so as hardly to be perceived from M towards N.

In the intersection of this circle, and the outward iris GKI, there broke out two parhelia or mock-suns, N and K, not quite perfect; K being rather weak, but N shone brighter and stronger. The brightness of the middle of them was something like that of the sun; but towards the edges they were tinged with colours like those of the rainbow; and they were uneven and ragged. The parhelion N was a little wavering, and sent out a spiked tail, NP, of a colour somewhat fiery, the length of which was continually changing.

The parhelia at L and M in the horizontal ring were not so bright as the former; but were rounder, and white, like the circle in which they were placed. The parhelion N disappeared before K; and while M grew fainter, K grew brighter, and vanished the last of all.

It is to be observed farther, that the order of the colours in the circles DEF, GKN, was the same as in the common halos, namely, red next the sun; and the diameter of the inner circle was also about 45 degrees; which is the usual size of a halo.

Various hypotheses have been framed by philosophers to account for this phenomenon. None of them are satisfactory; but the reader who chooses to know them may consult Dr Priestley's *History of Vision, Light, and Colours*, vol. ii. p. 619.

PARIA, or **NEW ANDALUSIA**, a country of Terra Firma in South America; bounded on the north by the north sea; on the east, by Surinam; on the west, by New Granada and the Caraccas; and on the south, by Guiana. It produces colouring drugs, gums, medicinal roots, Brazil-wood, sugar, tobacco, and some valuable timber; the inland parts being woody and mountainous, but interspersed with fine valleys that yield corn and pasturage. Comana is the capital town.

PARIAN MARBLE, in the natural history of the ancients, the white marble used then, and to this day, for carving statues, &c. and called by us at this time *statuary marble*.

Too many of the later writers have confounded all the white marbles under the name of the *Parian*; and among the workmen, this and all the other white marbles have the common name of *alabasters*; so that it is in general forgotten among them, that there is such a thing as alabaster different from marble; which, however, is truly the case. Almost all the world also have confounded the Carrara marble with this, though they are really very different; the Carrara kind being of a finer structure and clearer white than the Parian; but

but less bright and splendid, harder to cut, and not capable of so glittering a polish.

The true Parian marble has usually somewhat of a faint bluish tinge among the white, and often has blue veins in different parts of it. It is supposed by some to have had its name from the island Paros, one of the Cyclades in the *Ægean* Sea, where it was first found; but others will have it to have been so called from Agoracritus Parius, a famous statuary, who ennobled it by cutting a statue of a Venus in it.

PARIETALIA ossa, in anatomy. See there n° 12.

PARIETARIA, *PELLITORY of the wall*; a genus of the order of monœcia belonging to the polygamia class of plants. There are six species, of which one named the *officinalis*, is used in medicine. This has a creeping root. The stalk grows erect, is rough to the touch, and adhesive. The leaves are alternate, elliptical, lanceolate, veined, and a little rough. The flowers grow out of the axils of the leaves, in sessile, branched, verticillate clusters, of a greenish colour tinged with red. The anthers have a great degree of sensibility; for, if irritated with the point of a pin, they fly from the calix with elastic force, and throw out their powder.—The plant has a cooling and diuretic quality. Three ounces of the juice taken internally, or a fomentation externally applied, have been found serviceable in the strangury.—The plant laid upon heaps of corn infested with weevils, is said to drive away those destructive insects.

PARIS (Matthew), one of our best historians from William the Conqueror, to the latter end of the reign of Henry III. But of his life few particulars have been transmitted to us. Leland, his original biographer, without determining whether he was born in France or England, informs us, that he was a monk of St Alban's, and that he was sent by pope Innocent to reform the monks of the convent at Holm in Norway. Bishop Bale, the next in point of time, adds to the above relation, that, on account of his extraordinary gifts of body and mind, he was much esteemed, particularly by king Henry III. who commanded him to write the history of his reign. Fuller makes him a native of Cambridgeshire, because there was an ancient family of his name in that country. He also mentions his being sent by the pope to visit the monks in the diocese of Norwich. Bishop Tanner, bishop Nicolson, Monsieur du Pin, and the *Nouveau Dictionnaire Historique*, add not a single fact to those above related. Matthew Paris died in the monastery of St Alban's in the year 1259. He was doubtless a man of extraordinary knowledge for the 13th century; of an excellent moral character, and, as an historian, of strict integrity. His style is unpolished; but that defect is sufficiently atoned for by the honest freedom with which he relates the truth, regardless of the dignity or sanctity of the persons concerned. His works are, 1. *Historia ab Adamo ad Conquestum Anglie*, lib. i. manuscript. col. C. C. Cantab. c. ix. Most of this book is transcribed, by Matthew of Westminster, into the first part of his *Florilegium*. 2. *Historia major, seu rerum Anglicanarum historia à Gul. Conquestoris adventu ad annum 43 Henrici III. &c.* several times printed. The first

part of this history, viz. to the year 1235, is transcribed almost verbatim from the Chronicle of Roger Wendover; and the Appendix, from the year 1260, is the work of William Rihanger, who was also a monk of St Alban's. 3. *Vite duorum Offarum, Merchie regum, S. Albani fundatorum*. 4. *Gesta 22 abbatum S. Albani*. 5. *Additamenta chronicorum ad hist. majorem*; printed. 6. *Historia minor, seu epitoma majoris historie*; manuscript. Besides many other things in manuscript.

PARIS, the son of Priam king of Troy, memorable in history for carrying off Helena the wife of Menelaus king of Sparta in his absence, which occasioned the famous siege of Troy. Slain there about 1188 B.C.

PARIS, the capital of the kingdom of France; is situate on the river Seine, in the isle of France, being one of the largest and finest cities in Europe. It derived its modern name from the ancient Parisii; and is supposed by some to have had the Latin name of *Lutetia*, from *Lutum*, "mud," the place where it now stands having been anciently very marshy and muddy. Ever since the reign of Hugh Capet, that is, for near 800 years, this city hath been the usual residence of the kings of France: it is of a circular form, and, including the suburbs, about five French leagues, or 15 English miles, in circumference. The number of its inhabitants is computed at about 500,000; that of its streets 912; and that of its houses upwards of 20,000, exclusive of the public structures of all sorts. Its greatest defect, according to some, is the want of good drinking-water; but others tell us, that very fine water is brought by an aqueduct from the village of Arcueil, not far from Paris, but own the water of the Seine, and the city, is not good. The streets are of a proper breadth, well built, paved, and lighted. There is a great number of tribunals and offices here; most of which are kept in the Palais, situated on an island, to which it gives name. The number of churches, convents, hospitals, market-places, fountains, gates, and bridges, in this city is very great; besides the university, several academies, public libraries, royal palaces and castles, and above 100 hotels, some of them very stately. But to be more particular, that part called *la Cité*, lies in the centre, and consists of three islands formed by the Seine, viz. L'Île de Palais, L'Île de Notre Dame, and L'Île Louviers. It is the principal of the three parts into which the city is divided, and contains the following remarkable structures: 1. Several bridges; of which some are of wood and others of stone, and have most of them a row of houses on each side. The chief of these are the Pont-neuf and Pont-royal: the first consists of 12 arches, which, properly speaking, make two bridges, the one leading from the suburbs of St Germain to the city, and the other from thence to that part called *la Ville*: there is a carriage-way in the middle, 30 feet broad, and foot-walks on each side, raised two feet high; and in the centre stands a brass statue of king Henry IV. on horseback. On this bridge is also the building called *la Samaritaine*, from a group of figures upon it representing our Saviour and the Samaritan woman, standing near Jacob's well. Here is a pump to raise the water, which through several pipes supplies the quarter of the Louvre, and some other parts of the town.

The Pont-royal, which leads to the Thuilleries, was built by order of Lewis XIV. in the room of a wooden bridge that was carried away by the current in 1684. 2. The cathedral of Notre Dame, or our Lady, being dedicated to the Holy Virgin, which is a large stately Gothic structure, said to have been founded by king Childeric, and built in the form of a cross. Here, besides other great personages, are interred the cardinals de Retz and Noailles. From the two square towers belonging to it, is a noble prospect of the city and neighbouring country. Here is a vast quantity of gold and silver plate, rich tapestry, and fine paintings; and the number of the canons is no less than 50. Near it stands the palace of the archbishop, in which is the advocates library: the revenue of the archbishop amounts to about 180,000 livres; and his taxation to the court of Rome is 4283 guilders. 3. The priory and parish-church of St Bartholomew; the last of which is the most beautiful in all this part of the city, and stands near the Palais. 4. The Palais, which gives name to an island, and in which the parliament, with a great many other courts, are held. It was anciently the residence of the kings; but was given to the officers of justice by Philip the Fair, who also settled the parliament here in 1302. The parliament, consisting of several chambers, each of which has its department, is opened the day after Martinmas with a solemn mass, celebrated by a bishop, and continues sitting till the 8th of September, when a vacation-chamber is appointed during the interval, for criminal causes, and others which require dispatch. The jurisdiction of this court is of great extent. There is a beautiful chapel belonging to the Palais; in which is also the prison, or jail, for the jurisdiction of the parliament, called in French *La Conciergerie*. 5. The Hotel Dieu, the most ancient and largest hospital in Paris, in which 8000 sick and infirm poor are taken care of, and attended by the nuns of the order of St Augustine. 6. The hospital of St Catharine, where poor women and maidens are entertained three days, and attended by the above-mentioned nuns. 7. The Grande Chatelet, where some of the inferior courts of justice hold their sessions. 8. Fort l'Eveque, in which is the mint and a prison. It stands in or near the street La Ferroniere, in which Henry IV. was stabbed by Ravilliac. 9. St Germain l'Auxerrois, which is called the *royal palace church*; because the palaces of the Louvre and Thuilleries stand in its parish. 10. The Louvre, an ancient royal palace, of which a part was rebuilt by Lewis XIV. Had it been completed on the same plan, it would have been a most magnificent structure. On one of its gates is the following inscription, *Dum totum impleat orbis*: the meaning of which is, "May it last till the owner of it hath extended his sway over the whole world;" which implies what the French kings have constantly aimed at. Another inscription shews, at the same time, the vanity of the nation, and their abject flattery of their grande monarque. It may be rendered in English thus:

Louvre is a palace for great Lewis fit:
God him alone exceeds, as heaven does it.

This palace is joined to the Thuilleries by a gallery, in which are 180 models of fortresses, some situated in France, and some in other countries, executed with the utmost accuracy. Here is a valuable collection

of paintings; the king's printing-house, the mint where the king's medals are struck, together with a prodigious quantity of rich tapestry hangings, and a collection of ancient arms, among which are those worn by Francis I. at the famous battle of Pavia. Here also the French academy, the academy of inscriptions and belles lettres, the royal academy of sciences, the academy of painting and sculpture, and the royal academy of architecture, have their meetings. The first of these was founded for the improvement of the French language; and as for the others, their names explain the design of their institution. 11. Le Palais Royal, which was built by cardinal Richlieu, in the year 1636, and belongs to the duke of Orleans. It is said to contain pictures to the value of four millions of livres, which were purchased by the regent of that title, and of which a part belonged to Christina queen of Sweden. 12. The palace des Tuilleries, so called from a tile or brick-kiln which stood there formerly. This palace, as we observed above, communicates with the Louvre by a gallery. Behind it are exceeding pleasant gardens, adorned with fine walks, planted with ever-greens, and other trees, and with beautiful parterres, where are to be seen, all the year round, every flower according to its season. There are also three fine fountains, the garden, and a canal. Behind the Tuilleries, on the bank of the river, are pleasant walks, composed of four rows of lofty elms, to which vast crowds of people resort in the fine weather, as well as to the gardens. In the palace is a spacious and magnificent theatre, and hard by it are the Elysian fields, where a surprising number of coaches are to be seen in fair weather: not far off is the church of St Roche, where the celebrated poet Corneille is interred. 13. La place de Louis le Grand, a very beautiful square, in the centre of which is an equestrian statue of that king, which is justly accounted a master-piece. 14. The Place, or Square des Victoires, which is round, and contains a statue of Lewis XIV. of gilt brass, erected to him by the duke de la Feuillade, with this inscription, *Viro immortalis*. 15. The Royal Library in the Rue Vivien, which contains 94,000 printed books, 30,000 manuscripts, and a prodigious collection of copperplates and medals. Near by, in the church-yard of St Joseph, lies the famous comic poet Moliere. 16. The parish-church of St Eustace, which stands in the quarter of the same name, and contains the tomb of the great minister Colbert. 17. The gate of St Dennis, which was erected as a triumphal arch in honour of Lewis XIV. 18. The gate of St Martin, erected also in form of a triumphal arch, in honour of the same king. Not far from hence, in the church-yard of St Nicholas des Champs, Peter Gassendi, and other learned men, are buried. 19. La Greve, an open place, where all public rejoicings are celebrated, and malefactors executed. 20. The Hotel de Ville, which is a large building of Gothic architecture, tho' adorned with columns of the Corinthian order. 21. The arsenal in the quarter of St Paul, consisting of many spacious buildings, among which are a foundry, and a house for making saltpetre. Here is a musketoon of two barrels, which it is said will pierce a thick board at the distance of six miles; and, for discerning an object at that distance, has a telescope fixed to the barrel. 22. The Bastille, a kind of fortress like the

Paris.

the Tower of London, which is used as a prison for state-criminals, and for such as are taken up by letters de cachet, i. e. by warrants signed by the king, and sealed. 23. Le Temple, a commandery of the knights of Malta, which gives name to a quarter, wherein, being a privileged place, artificers, that are not freemen, may carry on their business without molestation. The temple is the residence of the grand prior of the French nation. 24. That formerly called *La Maison professée des Jésuites*, in the quarter of St Anthony, in the church of which the hearts of Lewis XIII. and XIV. are preserved, each in a casket of gold, supported by two angels of massy silver, and as big as the life, hovering with expanded wings. In the same quarter is a fine looking-glass manufacture, where above 500 persons are employed in polishing plates call'd at St Gobin; with a convent of Franciscans, the monks of which are called *Pique-puces*, or *Prick fleas*.

In that part of the city called the *University*, the principal places are,

1. The university which gives name to it, and which was first founded, as it is said, by Charles the Great: all the arts and sciences are taught here, particularly law, physic, and divinity. There are above forty colleges; of which the chief are those of Sorbonne, of Navarre, of the faculty of physic, and of the four nations; but lectures are read only in eleven of them. The head of the university is the rector, who is chosen every three months, but sometimes is continued several years. All the professors have settled salaries; the whole annual income of the university amounting, it is said, to about 50,000 livres. 2. The Gobelins, a house or palace, where a great number of ingenious artists, in various manufactures and handicrafts, are employed by the government. The most curious tapestry of all sorts is made here. 3. The General Hospital, a most noble foundation for the poor of the female sex, near 7000 objects being taken care of and provided for. The sick are carefully tended; and those that are in health are obliged to work; different wards being allotted for foundlings, for girls who sew or knit, prostitutes, idiots, and poor women: of the last, some are kept gratis, and others pay a small matter. In the castle of Bicetre, belonging to this hospital, and consisting of many large buildings, are near 4000 persons of the other sex, among which are persons disordered in their senses, and such as are afflicted with the venereal disease. To this hospital are also sent children who abuse their parents, and lead dissolute lives. The fund for the maintenance of it, and the hospital de la Pitié, where poor children are brought up, together with the Hotel Dieu, amounts to above two millions of livres *per annum*. 4. The King's Physic Garden, in which are an infinite variety of plants and trees, a certain fun being allotted by the king for keeping the garden in order, and improving it, and for lectures on botany, anatomy, chemistry, and the materia medica. A curious collection of natural curiosities is kept here. 5. The abbey of St Victor, in which is a public library, containing some very ancient and scarce books, several curious manuscripts, and a prodigious collection of maps and copperplates. 6. The College of Physicians, to which belong five professors. 7. The Little Chatelet, an old fortress, now used for a prison. 8. The Rue St Jacques, chief-

ly inhabited by booksellers. 9. The Royal College, and that of Lewis the Great: to the former belong twelve professors. 10. The Abbey of St Genevieve, in which is the marble monument of king Clovis, the shrine of St Genevieve, a large library, with a cabinet of antiquities and natural curiosities. 11. The Royal Observatory, a most stately edifice, built on the highest part of the city. Several astronomers are maintained here by the king. 12. The Royal Academy of surgery, instituted in 1731. 13. The Convent of Franciscans, in the quarter of St Andrew, the richest in France. In the same quarter are some remains of the palace of Julian the Apostate, in which Chilbert, and some other kings of the Franks, afterwards resided. 14. The Play-house. 15. The Convent of Carthusians, in the quarter of Luxemburg, containing fine paintings. 16. The Palace of Luxemburg, or Orleans, a magnificent structure, containing also some fine paintings by Rubens, and embellished with a noble garden. In the Hotel des Ambassadeurs, ambassadors extraordinary are entertained for three days, and those of remote countries all the time they stay at Paris. 17. The Abbey of St Germain des Prez, which contains a very valuable library, the manuscripts alone making 8,000 volumes: here also is a cabinet of antiquities. 18. The Hotel royal des Invalides, erected by Lewis XIV. in which lame and superannuated officers and soldiers are maintained. The buildings take up no less than 17 acres. The number of common soldiers here amount to about 3000, and of officers to about 500. The chapel is very magnificent. Hard by is a military academy, in which 500 young gentlemen are instructed in the art of war.

PARIS, herb Paris, or truelove; a genus of the trigynia order, belonging to the octandria class of plants. There are but one species, growing naturally in woods and shady places both in Scotland and England. It hath a single naked stem, greenish blossoms, and bluish black berries.—The leaves and berries are said to partake of the properties of opium; and the juice of the berries is useful in inflammations of the eyes. Linnæus says, that the root will vomit as well as ipecacuanha, but must be taken in double the quantity. Goats and sheep eat the plant; cows, horses, and swine, refuse it.

PARISH, the precinct of a parochial church, or a circuit of ground inhabited by people who belong to one church, and are under the particular charge of its minister.

The word comes from the Latin *parochia*, the Greek *παροικία*, "habitation;" compounded of *παρά*, "near," and *οἶκος*, "house."—Accordingly Du Cange observes, that the name *παροικία* was anciently given to the whole territory of a bishop, and derives it from neighbourhood; because the primitive Christians, not daring to assemble openly in cities, were forced to meet secretly in neighbourhood-houses.

In the ancient church there was one large edifice in each city for the people to meet in; and this they called *parochia*, *parish*. But the signification of the word was afterwards enlarged, and by a parish was meant a diocese, or the extent of the jurisdiction of a bishop, consisting of several churches; unless we will suppose, as some do, that those bishops were only

Paris,
Parish.

only pastors of single churches. See *DIOCESE* and *BISHOP*.

Du Pin observes, that country parishes had not their origin before the 4th century; but those of cities are more ancient. The city of Alexandria is said to have been the first that was divided into parishes.

PARISII, (anc. geog.), a people of Gallia Celtica, inhabiting the country about the Sequana and Matrona. Now a great part of the isle of France.—*Parisi*, (Ptolemy), a people of Britain, having the Brigantes to the north and west, the German sea to the east, and the Coritani to the south, from whom they were separated by the Humber. Now *Holderness*, a peninsula of the East Riding of Yorkshire.

PARISIURUM CIVITAS. See *LUTETIA*.

PARIUM, (anc. geog.), a noble city of Mysia Minor, with a port on the Propontis; called *Adrasia* by Homer, according to Pliny; but Strabo distinguishes them; according to others, the *Paslos* of Homer. *Pariani*, the people, (Strabo). The birthplace of Neoptolemus surnamed *Glossographus*, (Strabo). Here stood a Cupid equal, in exquisite workmanship, to the Cnidian Venus.

PARK, (French *parque*, i. e. *locus inclusus*), is a large quantity of ground inclosed and privileged for wild beasts of chase, by the king's grant or prescription. See *CHASE* and *FOREST*.

Munwood defines a chase to be "a privileged place for beasts of venary, and other wild beasts of the forest and chase, *tam Sylvestres, quam Campestres*;" and differs from a chase or warren, in that it must be inclosed; for if it lies open, it is good cause of seizure into the king's hands, as a thing forfeited: as a free chase is, if it be inclosed: besides, the owner cannot have an action against such as hunt in his park, if it lies open. No man can erect a park without licence under the broad seal; for the common law does not encourage matter of pleasure, which brings no profit to the commonwealth. But there may be a park in reputation, erected without any lawful warrant; and the owner may bring his action against persons killing his deer.

To a park three things are required. 1. A grant thereof. 2. Inclosures by pale, wall, or hedge. 3. Beasts of a park; such as the buck, doe, &c. And where all the deer are destroyed, it shall no more be accounted a park; for a park consists of vert, venison, and inclosure; and if it is determined in any of them, it is a total disparking.

Parks as well as chases are subject to the common law, and are not to be governed by the forest laws.

PARK, as connected with gardening. See *GARDENING*.

A park and a garden are more nearly allied than a farm and a garden*, and can therefore be accommodated to each other without any disparagement to either. A farm loses some of its characteristic properties by the connection, and the advantage is on the part of the garden; but a park thus bordered retains all its own excellencies; they are only enriched, not counteracted, by the intermixture. The most perfect composition of a place that can be imagined, consists of a garden opening into a park, with a short walk through the latter to a farm, and ways along its glades to ridings in the country: but to the farm and the ri-

dings the park is no more than a passage; and its woods and its buildings are but circumstances in their views;—its scenes can be communicated only to the garden.

The affinity of the two subjects is so close, that it would be difficult to draw the exact line of separation between them. Gardens have lately encroached very much both in extent and in style on the character of a park; but still there are scenes in the one which are out of the reach of the other. The small sequestered spots which are agreeable in a garden would be trivial in a park; and the spacious lawns which are among the noblest features of the latter, would in the former fatigue by their want of variety; even such as, being of a moderate extent, may be admitted into either, will seem bare and naked, if not broken in the one; and lose much of their greatness, if broken, in the other. The proportion of a part to the whole is a measure of its dimensions: it often determines the proper size for an object, as well as the space fit to be allotted to a scene; and regulates the style which ought to be assigned to either.

But whatever distinctions the extent may occasion between a park and a garden, a state of highly cultivated nature is consistent with each of their characters; and may in both be of the same kind, though in different degrees.

The excellencies both of a park and of a garden are happily blended at Hagley (A), where the scenes are equally elegant and noble. It is situated in the midst of a fertile and lovely country, between the Clent and the Witchberry hills; neither of which are within the pale, but both belong to the place. The latter rise in three beautiful swells. One of them is covered with wood; another is an open sheep-walk, with an obelisk on the summit; on the third, the portico of the temple of Theseus, exactly on the model of that at Athens, and little less in the dimensions, stands boldly out upon the brow, backed by the dark ground of a plantation, and has a most majestic appearance above the sweeps which fall before and beside it. The house is seen to the greatest advantage from these eminences, and every point of them commands some beautiful prospect. The busy town of Stourbridge is just below them; the ruins of Dudley castle rise in the offskip; the country is full of industry and inhabitants; and a small portion of the moor, where the minerals, manufactured in the neighbourhood, are dug, breaking in upon the horizon, accounts for the richness, without derogating from the beauty, of the landscape. From the Clent hills the views are still greater; they extend on one side to the black mountains in Wales, a long ridge which appears, at 60 miles distance, in the interval between the unweildy heap of the Malvern hills, and the solitary peak of the Wrekin, each 30 miles off, and as many asunder. The smook of Worcester, the churches in Birmingham, and the houses in Stourbridge, are distinctly visible. The country is a mixture of hill and dale, and strongly inclosed; except in one part, where a heath, varied by rising grounds, pieces of water, and several objects, forms an agreeable contrast to the cultivation which surrounds it. From the other extremity of the Clent hills, the prospect is less extensive; but the ground is more rude and broken: it is often overpread with large and beautiful woods; and the view is dignified with numerous seats. The hills also

* See *Farm*
and *Garden-
ing*.

being very irregular, large advanced promontories frequently interrupt the sight, and vary the scene: in other parts, deep valleys shelving down towards the country below, exhibit the objects there in different lights. In one of these hollows is built a neat cottage, under a deep descent, sheltered besides by plantations, and presenting ideas of retirement in the midst of so much open exposure; from the heights above it, is seen all that view which before was commanded from the Witchberry hills, but which is seen here over Hagley park; a noble fore-ground, beautiful in itself, and completing the landscape.

The house, though low in the park, is yet above the adjacent country, which it overlooks to a very distant horizon. It is surrounded by a lawn of fine uneven ground, and diversified with large clumps, little groupings, and single trees. It is open in front, but covered on one side by the Witchberry hills; on the other side, and behind, by the eminences in the park, which are high and steep, and all overpread with a lofty hanging wood. The lawn pressing to the foot, or creeping up the slopes of these hills, and sometimes winding along glades into the depth of the wood, traces a beautiful outline to a sylvan scene, already rich to luxuriance in massiness of foliage and stateliness of growth.

But though the wood appears to be entire, it in reality opens frequently into lawns, which occupy much of the space within it. In the number, the variety, and the beauty of these lawns, in the shades of the separations between them, in their beauties also, and their varieties, the glory of Hagley consists. No two of the openings are alike in dimensions, in shape, or in character. One is of no more than five or six acres; another of not less than fifty; and others are of all the intermediate sizes. Some stretch out into lengthened glades; some widen every way: they are again distinguished by buildings, by prospects, and often by the style only of the plantations around them. The boundary of one is described by a few careless lines; that of another is composed of many parts, very different and very irregular; and the ground is never flat; but falls sometimes in steep descents, sometimes in gentle declivities waves along easy swells, or is thrown into broken inequalities, with endless variety.

An octagon seat, sacred to the memory of Thomson, and erected on his favourite spot, stands on the brow of a steep; a mead winds along the valley beneath, till it is lost on either hand behind some trees. Opposite to the seat, a noble wood crowns the top, and feathers down to the bottom of a large, oval, swelling hill. As it defends on one side, the distant country becomes the offskipp. Over the fall, on the other side, the Clent hills appear. A dusky antique tower stands just below them, at the extremity of the wood; and in the midst of it is seen a Doric portico, called *Pope's Building*, with part of the lawn before it. The scene is very simple: the principal features are great; they prevail over all the rest, and are intimately connected with each other.

The next opening is small, circling about a rotunda on a knole, to the foot of which the ground rises every way. The trees which surround it are large; but their foliage is not very thick; and their stems appearing beneath, their ramifications between the boughs are, in so confined a spot, very distinguished and agreeable

circumstances. It is retired; has no prospect; no visible outlet but one, and that is short and narrow, to a bridge with a portico upon it, which terminates a piece of water.

The grove behind the rotunda separates this from a large, airy, forest glade, thinly skirted with wood, careles of drefs, and much overgrown with fern. The wildness is an acceptable relief in the midst of so much elegance and improvement as reign in the neighbouring lawns; and the place is in itself pleasant; in no part confined; and from a Gothic seat at the end is a perspective view of that wood and tower which were seen before in front, together with the Witchberry hills, and a wide range of country.

The tower, which in prospect is always connected with wood, stands however on a piece of down, which stretches along the broad ridge of a hill, and spreads on each hand for some way down the sides. Thick groves catch the falls. The descent on the right is soon lost under the trees; but that on the left being steeper and shorter, it may be followed to the bottom. A wood hangs on the declivity, which is continued in the valley beneath. The tower overlooks the whole: it seems the remains of a castle, partly entire, partly in ruins, and partly overgrown with bushes. A finer situation cannot be imagined: It is placed in an exposed unfrequented spot; commands an extensive prospect; and is every where an interesting object.

At the end of the valley below it, in an obscure corner, and shut out from all view, is a hermitage, composed of roots and of moss: high banks, and a thick covert darkened with horse-chestnuts, confine the sequestered spot: a little rill trickles through it, and two small pieces of water occupy the bottom. They are seen on one side through groupings of trees; the other is open, but covered with fern. This valley is the extremity of the park; and the Clent hills rise in all their irregularity immediately above it.

The other descent from the castle is a long declivity, covered like the rest with noble woods, in which fine lawns are again embosomed, differing still from the former, and from each other. In one, the ground is very rough, the boundary is much broken, and marked only by the trunks of the trees which shoot up high before the branches begin. The next is more simple; and the ground falls from an even brow into one large hollow, which slopes towards the glen, where it links into the covert. This has a communication thro' a short glade, and between two groves, with another called the *Tinian lawn*, from the resemblance which it is said to bear to those of that celebrated island: it is encompassed with the stateliest trees, all fresh and vigorous, and so full of leaf, that a stem, not a branch, appears, but large masses of foliage only describe an undulating outline: the effect, however, is not produced by the boughs feathering down to the bottom; they in appearance shoot out horizontally, a few feet above the ground, to a surprising distance, and form underneath an edging of shade, into which the retreat is immediate at every hour of the day. The verdure of the turf is as luxuriant there as in the open space: the ground gently waves in both over easy swells and little dips, just varying, not breaking, the surface. No strong lines are drawn; no striking objects are admitted; but all is of an even temper, all mild,

Park.

mill, placid, and serene; in the gayest season of the day not more than cheerful, in the stillest watch of night not gloomy. The scene is indeed peculiarly adapted to the tranquillity of the latter, when the moon seems to repose her light on the thick foliage of the grove, and steadily marks the shade of every bough. It is delightful then to saunter here, and see the grails, and the gossamer which entwines it, glistening with dew; to listen and hear nothing stir, except perhaps a withered leaf dropping gently through a tree; and, sheltered from the chill, to catch the freshness of the evening air: a solitary urn, chosen by Mr Pope for the spot, and now inscribed to his memory, when shewn by a gleam of moon-light through the trees, fixes that thoughtfulness and compolure to which the mind is insensibly led by the rest of this elegant scene.

The Doric Portico, which also bears his name, tho' not within sight, is near: it is placed on the declivity of a hill; and Thomson's seat, with its groves and appendages, are agreeable circumstances in the prospect before it. In the valley beneath is fixed a bench, which commands a variety of short views; one is up the ascent to the portico, and others thro' openings in the wood to the bridge and the rotunda.

The next lawn is large: the ground is steep and irregular, but inclines to one direction, and falls from every side into the general declivity: the outline is diversified by many groupes of trees on the slopes; and frequent glimpses of the country are seen in perspective through openings between them. In the brow is a seat, in the proudest situation of all Hagley; it commands a view down the bold sweep of the lawn, and over a valley filled with the noblest trees, up to the heights beyond. One of those heights is covered with a hanging wood; which opens only to shew Thomson's seat, and the groves and the steep above it: the others are the Witchberry hills, which seem to press forward into the landscape; and the massy heads of the trees in the vale, uniting into a continued surface, form a broad base to the temple of Theseus, hide the swell on which it is built, and crowd up to the very foundation. Farther back stands the obelisk; before it is the sheep-walk; behind it the Witchberry wood. The temple is backed by the firs; and both these plantations are connected with that vast sylvan scene, which overpreads the other hill, and all the intermediate valley. Such extent of wood; such variety in the disposition of it; objects so illustrious in themselves, and ennobled by their situations, each contrasted to each, every one distinct, and all happily united: the parts so beautiful of a whole so great, seen from a charming lawn, and surrounded by a delightful country, compose all together a scene of real magnificence and grandeur.

The several lawns are separated by the finest trees; which sometimes grow in airy groves, chequered with gleams of light, and open to every breeze; but more frequently, whose great branches meeting or crossing each other, cast a deep impenetrable shade. Large boughs feathering down often intercept the sight; or a vacant space is filled with coppice-wood, nut, hawthorn, and hornbeam, whose tufted heads mixing with the foliage, and whose little stems clustering about the trunks of the trees, thicken and darken the planta-

tion. Here and there the division is of such coppice-wood only, which then being less constrained and oppressed, springs up stronger, spreads further, and joins in a low vaulted covering: in other places the shade is high, over-arched by the tallest ash, or spreads under the branches of the most venerable oaks. They rise in every shape, they are disposed in every form in which trees can grow. The ground beneath them is sometimes almost level; sometimes a gentle swell; but generally very irregular and broken. In several places, large hollows wind down the sides of the hills, worn in the stormy months by water-courses, but worn many ages ago. Very old oaks in the middle of the channels prove their antiquity: some of them are perfectly dry most part of the year; and some are watered by little rills all the summer: they are deep and broad; the sides are commonly steep; often abrupt and hollow; and the trees on the bank sometimes extend their roots, all covered with moss, over the channels of the water. Low down in one of these glens, under a thick shade of horse-chestnuts, is a plain bench, in the middle of several little currents and water-falls, running among large loose stones, and the stumps of dead trees, with which the ground is broken. On the brink of another glen, which is distinguished by a numerous rookery, is a seat in a still wilder situation, near a deeper hollow, and in a darker gloom: the falls are nearly perpendicular; the roots of some of the trees are almost bare, from the earth having crumbled away; large boughs of others, sinking with their own weight, seem ready to break from the trunks they belong to; and the finest ash, still growing, lie all assant the water-course below, which, tho' the stream runs in winter only, yet constantly retains the black tinge of damp, and casts a chill all around.

Gravel-walks are conducted across the glens, thro' the woods, the groves, for the thickets, and along the sides of the lawns, concealed generally from the sight, but always ready for the communication, and leading to the principal scenes. The frequency of these walks, the number and the style of the buildings, and the high preservation in which all the place is kept, give to the whole park the air of a garden. There is, however, one spot more peculiarly adapted to that purpose, and more artificially disposed than the rest; it is a narrow vale, divided into three parts: one of them is quite filled with water, which leaves no room for a path, but thick trees on either side come down quite to the brink; and between them the sight is conducted to the bridge with a portico upon it, which closes the view: another part of this vale is a deep gloom, overhung with large ash and oaks, and darkened below by a number of yews: these are scattered over very uneven ground, and open underneath; but they are encompassed by a thick covert, under which a stream falls, from a stony channel, down a rock; other rills drop into the current, which afterwards pours over a second cascade into the third division of the vale, where it forms a piece of water, and is lost under the bridge. The view from this bridge is a perfect opera scene, through all the divisions of the vale, up to the rotunda. Both these buildings, and the other decorations of the spot, are of the species generally confined to a garden. The hermitage also, which has been described, and its appendages, are in a style which does

Park.

Park,
Parker.

not belong to a park; but through all the rest of the place, the two characters are intimately blended. The whole is one subject; and it was a bold idea to conceive that one to be capable of so much variety; it required the most vigorous efforts of a fertile fancy to carry that idea into execution. See GARDENING.

Park of Artillery. See ARTILLERY.

PARK of Provisions, in military affairs, the place where the sutlers pitch their tents in the rear, and sell their provisions to the soldiers. Likewise that place where the bread-waggons are drawn up, and where the troops receive their ammunition-bread, being the store of the army.

PARKER (Matthew), the second Protestant archbishop of Canterbury, was born at Norwich in the year 1504, the 19th of Henry VII. His father, who was a man in trade, died when our author was about 12 years old; but his mother took special care of his education, and at the age of 17 sent him to Corpus-Christi college in Cambridge, where, in 1523, he took his bachelor's degree. In 1527 he was ordained, created master of arts, and chosen fellow of the college. Having obtained a licence to preach, he frequently held forth at St Paul's cross in London, and in other parts of the kingdom. [In 1533 or 1534, he was made chaplain to queen Anne Boleyn, who obtained for him the deanry of Stoke-Clare in Suffolk, where he founded a grammar-school. After the death of the queen, king Henry made him his own chaplain, and in 1541, prebendary of Ely. In 1544, he was, by the king's command, elected master of Corpus-Christi college, and the following year, vice-chancellor of the university. In 1547, he lost the deanry of Stoke, by the dissolution of that college. In the same year he married the daughter of Robert Harlestone, a Norfolk gentleman.

In the year 1552, he was nominated, by Edward VI. to the deanry of Lincoln, which, with his other preferments, enabled him to live in great affluence; but the Papist Mary was hardly seated on the throne, before he was deprived of every thing he held in the church, and obliged to live in obscurity, frequently changing his place of abode to avoid the fate of the other reformers.

Queen Elizabeth ascended the throne in 1558; and in the following year Dr Parker, from indigence and obscurity, was at once raised to the see of Canterbury, an honour which he neither solicited nor desired. In this high station he acted with spirit and propriety. He repaired and beautified his palace at Lambeth at a vast expence; founded several scholarships in Bennet or Corpus-Christi college in Cambridge, and gave large presents of plate to that and to other colleges in this university. He gave 100 volumes to the public library. He likewise founded a free-school at Rochdale in Lancashire. He took care to have the fees filled with pious and learned men; and, considering the great want of libels in many places, he, with the assistance of other learned men, improved the English translation, had it printed on a large paper, and dispersed through the kingdom.

This worthy prelate died in the year 1575, aged 72, and was buried in his own chapel at Lambeth. He was pious without affectation or austerity, cheerful and contented in the midst of adversity, moderate

in the height of power, and beneficent beyond example. He wrote several books; and also published four of our best historians, *Matthew of Westminster*; *Matthew Paris*; *Asser's Life of king Alfred*; and *Tho. Walsingham*.

PARLEY, a conference with an enemy. Hence, to beat or sound a parley, is to give a signal for holding such a conference by beat of drum, or sound of trumpet.

PARLIAMENT, the grand assembly of the three states of this kingdom, summoned together by the king's authority, to consider of matters relating to the public welfare, and particularly to enact and repeal laws.

The original or first institution of parliaments is one of those matters which lie so far hidden in the dark ages of antiquity, that the tracing of it out is a thing equally difficult and uncertain. The word *parliament* itself (or *colloquium*, as some of our historians translate it) is, comparatively, of modern date; derived from the French, and signifying the place where they met and conferred together. It was first applied to general assemblies of the states under Louis VII. in France, about the middle of the 12th century. But it is certain, that, long before the introduction of the Norman language into England, all matters of importance were debated and settled in the great councils of the realm. A practice which seems to have been universal among the northern nations, particularly the Germans; and carried by them into all the countries of Europe, which they over-ran at the dissolution of the Roman empire. Relics of which constitution, under various modifications and changes, are still to be met with in the diets of Poland, Germany, and Sweden, and the assembly of the estates in France; for what is there now called the *parliament* is only the supreme court of justice, consisting of the peers, certain dignified ecclesiastics, and judges; which neither is in practice, nor is supposed to be in theory, a general council of the realm.

With us in England, this general council hath been held immemorably, under the several names of *michelsynoth*, or "great council," *michel-gemote*, or "great meetings," and more frequently *wittena-gemote*, or "the meeting of wise men." It was also styled in Latin, *commune concilium regni*, *magnam concilium regis*, *curia magna*, *conventus magnatum vel procerum*, *assisa generalis*, and sometimes *communitas regni Anglie*. We have instances of its meeting to order the affairs of the kingdom, to make new laws, and to amend the old, or, as Fleta expresses it, *novis injuriis emerfis nova constituere remedia*, so early as the reign of Ina king of the west Saxons. Offa king of the Mercians, and Ethelbert king of Kent, in the several realms of the heptarchy. And, after their union, the Mirrour informs us, that king Alfred ordained for a perpetual usage, that these councils should meet twice in the year, or oftener, if need be, to treat of the government of God's people; how they should keep themselves from sin, should live in quiet, and should receive right. Our succeeding Saxon and Danish monarchs held frequent councils of this sort, as appears from their respective codes of laws; the titles whereof usually speak them to be enacted, either by the king with the advice of his wittena-gemote, or wise men, as,

Parley,
Parliament.

Parliament. *Hæc sunt instituta, quæ Edgarus rex consilio sapientum suorum instituit; or to be enacted by those sages with the advice of the king, as, Hæc sunt judicia, quæ sapientes consilio regis Ethelstani instituerunt; or lastly, to be enacted by them both together, as, Hæc sunt institutiones, quas rex Edmundus et episcopi sui cum sapientibus suis instituerunt.*

There is also no doubt but these great councils were occasionally held under the first princes of the Norman line. Glanvil, who wrote in the reign of Henry II. speaking of the particular amount of an amerement in the sheriff's court, says, it had never yet been ascertained by the general assize, or assembly, but was left to the custom of particular counties. Here the general assize is spoken of as a meeting well known, and its statutes or decisions are put in a manifest contradiction to custom, or the common law. And in Edward III's time an act of parliament, made in the reign of William the Conqueror, was pleaded in the case of the abbey of St Edmund's-bury, and judicially allowed by the court.

Hence it indisputably appears, that parliaments, or general councils, are coeval with the kingdom itself. How those parliaments were constituted and composed, is another question, which has been matter of great dispute among our learned antiquarians; and particularly, whether the commons were summoned at all; or, if summoned, at what period they began to form a distinct assembly. But without entering into controversies of this sort, it may be sufficient to observe, that it is generally agreed, that in the main the constitution of parliament, as it now stands, was marked out so long ago as the 17th year of king John, A. D. 1215, in the great charter granted by that prince; wherein he promises to summon all archbishops, bishops, abbots, earls, and greater barons, personally; and all other tenants in chief under the crown, by the sheriff and bailiffs; to meet at a certain place, with 40 days notice, to assesse aids and scutages when necessary. And this constitution has subsisted in fact at least from the year 1266, 49 Hen. III. there being still extant writs of that date, to summon knights, citizens, and burgesses, to parliament. We proceed therefore to inquire wherein consists this constitution of parliament, as it now stands, and has stood for the space of at least 500 years. And in the prosecution of this inquiry, we shall consider, first, The manner and time of its assembling; Secondly, Its constituent parts: Thirdly, The laws and customs relating to parliament: Fourthly, The methods of proceeding, and of making statutes, in both houses: And, lastly, The manner of the parliament's adjournment, prorogation, and dissolution.

I. *As to the manner and time of assembling.* The parliament is regularly to be summoned by the king's writ or letter, issued out of chancery by advice of the privy-council, at least 40 days before it begins to sit. It is a branch of the royal prerogative, that no parliament can be convened by its own authority, or by the authority of any, except the king alone. And this prerogative is founded upon very good reason. For, supposing it had a right to meet spontaneously, without being called together, it is impossible to conceive that all the members, and each of the houses, would agree unanimously upon the proper time and place of

meeting: and if half of the members met, and half absented themselves, who shall determine which is really the legislative body, the part assembled, or that which stays away? It is therefore necessary, that the parliament should be called together at a determinate time and place; and, highly becoming its dignity and independence, that it should be called together by none but one of its own constituent parts: and, of the three constituent parts, this office can only appertain to the king; as he is a single person, whose will may be uniform and steady; the first person in the nation, being superior to both houses in dignity; and the only branch of the legislature that has a separate existence, and is capable of performing any act at a time when no parliament is in being. Nor is it an exception to this rule, that, by some modern statutes, on the demise of a king or queen, if there be then no parliament in being, the last parliament revives, and is to sit again for six months, unless dissolved by the successor: for this revived parliament must have been originally summoned by the crown.

It is true, that the convention-parliament which restored king Charles II. met above a month before his return; the lords by their own authority, and the commons in pursuance of writs issued in the name of the keepers of the liberty of England by authority of parliament; and that the said parliament sat till the 29th of December, full seven months after the Restoration; and enacted many laws, several of which are still in force. But this was for the necessity of the thing, which supercedes all law; for if they had not so met, it was morally impossible that the kingdom should have been settled in peace. And the first thing done after the king's return was, to pass an act declaring this to be a good parliament, notwithstanding the defect of the king's writs. So that as the royal prerogative was chiefly wounded by their so meeting, and as the king himself, who alone had a right to object, consented to waive the objection, this cannot be drawn into an example in prejudice of the rights of the crown. Besides, we should also remember, that it was at that time a great doubt among the lawyers, whether even this healing act made it a good parliament, and held by very many in the negative; though it seems to have been too nice a scruple. And yet, out of abundant caution, it was thought necessary to confirm its acts in the next parliament, by statute 13 Car. II. c. 7. & c. 14.

It is likewise true, at the time of the Revolution, A. D. 1688, the lords and commons by their own authority, and upon the summons of the prince of Orange, (afterwards king William), met in a convention, and therein disposed of the crown and kingdom. But it must be remembered, that this assembling was upon a like principle of necessity as at the Restoration; that is, upon a full conviction that king James the second had abdicated the government, and that the throne was thereby vacant: which supposition of the individual members was confirmed by their concurrent resolution, when they actually came together. And, in such a case as the palpable vacancy of a throne, it follows *ex necessitate rei*, that the form of the royal writs must be laid aside, otherwise no parliament can ever meet again. For let us put another possible case, and suppose, for the sake of argument, that the whole

Parliament. whole royal line should at any time fail, and become extinct, which would indubitably vacate the throne: in this situation it seems reasonable to presume, that the body of the nation, consisting of lords and commons, would have a right to meet and settle the government; or otherwise there must be no government at all. And upon this and no other principle did the convention in 1688 assemble. The vacancy of the throne was precedent to their meeting without any royal summons, not a consequence of it. They did not assemble without writ, and then make the throne vacant; but, the throne being previously vacant by the king's abdication, they assembled without writ, as they must do if they assembled at all. Had the throne been full, their meeting would not have been regular; but, as it was really empty, such meeting became absolutely necessary. And accordingly it is declared by statute 1 W. & M. II. c. 1. that this convention was really the two houses of parliament, notwithstanding the want of writs or other defects of form. So that, notwithstanding these two capital exceptions, which were justifiable only on a principle of necessity, (and each of which, by the way, induced a revolution in the government), the rule laid down is in general certain, that the king only can convoke a parliament.

And this, by the ancient statutes of the realm, he is bound to do every year, or oftener, if need be. Not that he is, or ever was, obliged by these statutes to call a new parliament every year; but only to permit a parliament to sit annually for the redress of grievances, and dispatch of business, if need be. These last words are so loose and vague, that such of our monarchs as were inclined to govern without parliaments, neglected the convoking them, sometimes for a very considerable period, under pretence that there was no need of them. But, to remedy this, by the statute 16 Car. II. c. 1. it is enacted, that the sitting and holding of parliaments shall not be intermitted above three years at the most. And by the statute 1 W. & M. II. c. 2. it is declared to be one of the rights of the people, that for redress of all grievances, and for the amending, strengthening, and preserving the laws, parliaments ought to be held frequently. And this indefinite frequency is again reduced to a certainty by statute 6 W. & M. c. 2. which enacts, as the statute of Charles the second had done before, that a new parliament shall be called within three years after the determination of the former.

II. *The constituent parts of a parliament are, the king's majesty, sitting there in his royal political capacity, and the three estates of the realm; the lords spiritual, the lords temporal, (who sit together with the king in one house), and the commons, who sit by themselves in another. And the king and these three estates together form the great corporation or body politic of the kingdom, of which the king is said to be caput, principium, et finis.* For upon their coming together the king meets them, either in person or by representation; without which there can be no beginning of a parliament; and he also has alone the power of dissolving them.

It is highly necessary for preserving the balance of the constitution, that the executive power should be a branch, though not the whole, of the legislature. The

total union of them, we have seen, would be productive of tyranny; the total disjunction of them, for the present, would in the end produce the same effects, by causing that union against which it seems to provide. The legislature would soon become tyrannical, by making continual encroachments, and gradually assuming to itself the rights of the executive power. Thus the long parliament of Charles the first, while it acted in a constitutional manner, with the royal concurrence, redressed many heavy grievances and established many salutary laws. But when the two houses assumed the power of legislation, in exclusion of the royal authority, they soon after assumed likewise the reins of administration; and, in consequence of these united powers, overturned both church and state, and established a worse oppression than any they pretended to remedy. To hinder therefore any such encroachments, the king is himself a part of the parliament; and as this is the reason of his being so, very properly therefore the share of legislation which the constitution has placed in the crown, consists in the power of rejecting, rather than resolving; this being sufficient to answer the end proposed. For we may apply to the royal negative, in this instance, what Cicero observes of the negative of the Roman tribunes, that the crown has not any power of doing wrong, but merely of preventing wrong from being done. The crown cannot begin of itself any alterations in the present established law; but it may approve or disapprove of the alterations suggested and consented to by the two houses. The legislature therefore cannot abridge the executive power of any rights which it now has by law, without its own consent; since the law must perpetually stand as it now does, unless all the powers will agree to alter it. And herein indeed consists the true excellence of the British government, that all the parts of it form a mutual check upon each other. In the legislature, the people are a check upon the nobility, and the nobility a check upon the people, by the mutual privilege of rejecting what the other has resolved; while the king is a check upon both, which preserves the executive power from encroachments. And this very executive power is again checked and kept within due bounds by the two houses, through the privilege they have of inquiring into, impeaching, and punishing the conduct (not indeed of the king, which would destroy his constitutional independence; but, which is more beneficial to the public) of his evil and pernicious counsellors. Thus every branch of our civil polity supports and is supported, regulates and is regulated, by the rest: for the two houses naturally drawing in two directions of opposite interest, and the prerogative in another still different from them both, they mutually keep each other from exceeding their proper limits; while the whole is prevented from separation, and artificially connected together by the mixed nature of the crown, which is a part of the legislative, and the sole executive magistrate. Like three distinct powers in mechanics, they jointly impel the machine of government in a direction different from what either, acting by itself, would have done; but at the same time in a direction partaking of each, and formed out of all; a direction which constitutes the true line of the liberty and happiness of the community.

Parliament. Having already considered these constituent parts of the sovereign power, or parliament, each in a separate view, under the articles KING, LORDS, and COMMONS, to which the reader is referred, we proceed,

III. To examine the laws and customs relating to parliament, united together and considered as one aggregate body. The power and jurisdiction of parliament, says Sir Edward Coke, is so transcendent and absolute, that it cannot be confined, either for causes or persons, within any bounds. And of this high court he adds, it may be truly said, *Si antiquitatem spectes, est vetustissima; si dignitatem, est honoratissima; si jurisdictionem, est capacissima*. It hath sovereign and uncontrollable authority in making, confirming, enlarging, restraining, abrogating, repealing, reviving, and expounding of laws, concerning matters of all possible denominations, ecclesiastical or temporal, civil, military, maritime, or criminal: this being the place where that absolute despotic power, which must in all governments reside somewhere, is entrusted by the constitution of these kingdoms. All mischiefs and grievances, operations and remedies, that transcend the ordinary course of the laws, are within the reach of this extraordinary tribunal. It can regulate or new-model the succession to the crown; as was done in the reign of Henry VIII. and William III. It can alter the established religion of the land; as was done in a variety of instances, in the reigns of king Henry VIII. and his three children. It can change and create afresh even the constitution of the kingdom and of parliaments themselves; as was done by the act of union, and the several statutes for triennial and septennial elections. It can, in short, do every thing that is not naturally impossible; and therefore some have not scrupled to call its power, by a figure rather too bold, the *omnipotence of parliaments*. True it is, that what the parliament doth, no authority upon earth can undo. So that it is a matter most essential to the liberties of this kingdom, that such members be delegated to this important trust as are most eminent for their probity, their fortitude, and their knowledge; for it was a known apothegm of the great lord treasurer Burleigh, "That England could never be ruined but by a parliament;" and, as Sir Matthew Hale observes, this being the highest and greatest court, over which none other can have jurisdiction in the kingdom, if by any means a misgovernment should any way fall upon it, the subjects of this kingdom are left without all manner of remedy. To the same purpose the president Montesquieu, though we trust too hastily, presages, that as Rome, Sparta, and Carthage, have lost their liberty and perished; so the constitution of England will in time lose its liberty, will perish: it will perish whenever the legislative power shall become more corrupt than the executive.

It must be owned that Mr. Locke, and other theoretical writers, have held, that "there remains still inherent in the people a supreme power to remove or alter the legislative, when they find the legislative act contrary to the trust reposed in them; for when such trust is abused, it is thereby forfeited, and devolves to those who gave it." But however just this conclusion may be in theory, we cannot adopt it, nor argue from it, under any dispensation of government at present actually existing. For this devolution of power,

to the people at large, includes in it a dissolution of Parliament. The whole form of government established by that people; reduces all the members to their original state of equality; and by annihilating the sovereign power, repeals all positive laws whatsoever before enacted. No human laws will therefore suppose a case, which at once must destroy all law, and compel men to build afresh upon a new foundation; nor will they make provision for so desperate an event, as must render all legal provisions ineffectual. So long therefore as the English constitution lasts, we may venture to affirm, that the power of parliament is absolute and without control.

In order to prevent the mischiefs that might arise, by placing this extensive authority in hands that are either incapable or else improper to manage it, it is provided by the custom and law of parliament, that no one shall sit or vote in either house, unless he be 21 years of age. This is also expressly declared by statute 7 & 8 W. III. c. 25: with regard to the house of commons, doubts have arisen, from some contradictory adjudications, whether or no a minor was incapacitated from sitting in that house. It is also enacted by statute 7 Jac. I. c. 6. that no member be permitted to enter the house of commons till he hath taken the oath of allegiance before the lord steward or his deputy: and by 30 Car. II. §. 2. and 1 Geo. I. c. 13. that no member shall vote or sit in either house till he hath, in the presence of the house, taken the oaths of allegiance, supremacy, and abjuration, and subscribed and repeated the declaration against transubstantiation, and invocation of saints, and the sacrifice of the mass. Aliens, unless naturalized, were likewise by the law of parliament incapable to serve therein: and now it is enacted, by statute 12 & 13 W. III. c. 2. that no alien, even though he be naturalized, shall be capable of being a member of either house of parliament. And there are not only these standing incapacities; but if any person is made a peer by the king, or elected to serve in the house of commons by the people, yet may the respective houses, upon complaint of any crime in such person, and proof thereof, adjudge him disabled and incapable to sit as a member: and this by the law and custom of parliament.

For as every court of justice hath laws and customs for its direction, some the civil and canon, some the common law, others their own peculiar laws and customs; so the high court of parliament hath also its own peculiar law, called the *lex et consuetudo parliamenti*; a law which Sir Edward Coke observes is *ab omnibus querenda, a multis ignorata, a paucis cognita*. It will not therefore be expected that we should enter into the examination of this law with any degree of minuteness; since, as the same learned author assures us, it is much better to be learned out of the rolls of parliament and other records, and by precedents and continual experience, than can be expressed by any one man. It will be sufficient to observe, that the whole of the law and custom of parliament has its original from this one maxim, "That whatever matter arises concerning either house of parliament, ought to be examined, discussed, and adjudged in that house to which it relates, and not elsewhere." Hence, for instance, the lords will not suffer the commons to interfere in settling the election of a peer of Scotland; the commons

commons will not allow the lords to judge of the election of a burgess; nor will either house permit the subordinate courts of law to examine the merits of either case. But the maxims upon which they proceed, together with the method of proceeding, rest entirely in the breast of the parliament itself; and are not defined and ascertained by any particular stated laws.

The privileges of parliament are likewise very large and indefinite; and therefore, when, in 3rd Hen. VI. the house of lords propounded a question to the judges concerning them, the chief justice, Sir John Fortescue, in the name of his brethren, declared, "That they ought not to make answer to that question; for it hath not been used aforetime, that the justices should in any wise determine the privileges of the high court of parliament; for it is so high and mighty in its nature, that it may make law; and that which is law, it may make no law: and the determination and knowledge of that privilege belongs to the lords of parliament, and not to the justices." Privilege of parliament was principally established, in order to protect its members not only from being molested by their fellow-subjects, but also more especially from being oppressed by the power of the crown. If therefore all the privileges of parliament were once to be set down and ascertained, and no privilege to be allowed but what was so defined and determined, it were easy for the executive power to devise some new case, not within the line of privilege, and under pretence thereof to harass any refractory member, and violate the freedom of parliament. The dignity and independence of the two houses are therefore in great measure preserved by keeping their privileges indefinite. Some, however, of the more notorious privileges of the members of either house, are privilege of speech, of person, of their domestics, and of their lands and goods. As to the first, privilege of speech, it is declared by the statute 1 W. & M. II. 2. c. 2. as one of the liberties of the people, "That the freedom of speech, and debates, and proceedings in parliament, ought not to be impeached or questioned in any court or place out of parliament." And this freedom of speech is particularly demanded of the king in person, by the speaker of the house of commons, at the opening of every new parliament. So likewise are the other privileges, of person, servants, lands, and goods; which are immunities as ancient as Edward the Confessor: in whose laws we find this precept, *Ad synodos venientibus, sine summoniti sint, sine per se quid agendum habuerint sit summa pax*; and so too in the old Gothic constitutions, *Extenditur hæc pax et securitas ad quatuordecim dies, convocato regni senatu*. This included formerly not only privilege from illegal violence, but also from legal arrests and seizures by process from the courts of law. And still to assault by violence a member of either house, or his menial servants, is a high contempt of parliament, and there punished with the utmost severity. It has likewise peculiar penalties annexed to it in the courts of law by the statutes 5 Hen. IV. c. 6. and 11 Hen. VI. c. 11. Neither can any member of either house be arrested and taken into custody without a breach of the privilege of parliament.

But all other privileges which derogate from the common law are now at an end, save only as to the freedom of the member's person; which in a peer (by

the privilege of peerage) is for ever sacred and inviolable; and in a commoner (by the privilege of parliament) for forty days after every prorogation, and forty days before the next appointed meeting; which is now in effect as long as the parliament subsists, it seldom being prorogued for more than eighty days at a time. As to all other privileges which obstruct the ordinary course of justice, they were restrained by the statutes 12 W. III. c. 3. 2 & 3 Ann. c. 18. and 11 Geo. II. c. 24. and are now totally abolished by statute 10 G. III. c. 50.; which enacts, that any suit may at any time be brought against any peer or member of parliament, their servants, or any other person entitled to privilege of parliament; which shall not be impeached or delayed by pretence of any such privilege, except that the person of a member of the house of commons shall not thereby be subjected to any arrest or imprisonment. Likewise, for the benefit of commerce, it is provided by statute 4 Geo. III. c. 33. that any trader, having privilege of parliament, may be served with legal process for any just debt, (to the amount of 100l.); and unless he makes satisfaction within two months, it shall be deemed an act of bankruptcy; and that commissions of bankrupt may be issued against such privileged traders in like manner as against any other.

The only way by which courts of justice could anciently take cognizance of privilege of parliament was by writ of privilege, in the nature of a *superfedeas*, to deliver the party out of custody when arrested in a civil suit. For when a letter was written by the speaker to the judges, to stay proceedings against a privileged person, they rejected it as contrary to their oath of office. But since the statute 12 Will. III. c. 3. which enacts, that no privileged person shall be subject to arrest or imprisonment, it hath been held, that such arrest is irregular *ab initio*, and that the party may be discharged upon motion. It is to be observed, that there is no precedent of any such writ of privilege, but only in civil suits; and that the statute of 1 Jac. I. c. 13. and that of king William, (which remedy some inconveniences arising from privilege of parliament), speak only of civil actions. And therefore the claim of privilege hath been usually guarded with an exception as to the case of indictable crimes; or, as it hath been frequently expressed, of treason, felony, and breach (or surety) of the peace. Whereby it seems to have been understood, that no privilege was allowable to the members, their families, or servants, in any crime whatsoever; for all crimes are treated by the law as being *contra pacem domini regis*. And instances have not been wanting, wherein privileged persons have been convicted of misdemeanors, and committed, or prosecuted to outlawry, even in the middle of a session; which proceeding has afterwards received the sanction and approbation of parliament. To which may be added, that a few years ago, the case of writing and publishing seditious libels was resolved by both houses not to be entitled to privilege; and that the reasons upon which that case proceeded, extended equally to every indictable offence. So that the chief, if not the only, privilege of parliament, in such cases, seems to be the right of receiving immediate information of the imprisonment or detention of any member, with the reason for which he is detained: a practice that is daily used upon the slightest military accusations, preparatory to a trial by a court:

Parliament court-martial; and which is recognized by the several temporary statutes for suspending the *habeas corpus* act: whereby it is provided, that no member of either house shall be detained, till the matter of which he stands suspected be first communicated to the house of which he is a member, and the consent of the said house obtained for his commitment or detaining. But yet the usage has uniformly been, ever since the Revolution, that the communication has been subsequent to the arrest.

These are the general heads of the laws and customs relating to parliament, considered as one aggregate body. The laws and customs relating to each branch in particular being explained under the articles already referred to, *viz.* KING, LORDS, and COMMONS, we should proceed, IV. To the method of making laws; which is much the same in both houses. But for this, too, we have to refer the reader to the article BILL; and shall only observe in this place, that, for dispatch of business, each house of parliament has its speaker. The speaker of the house of lords, whose office it is to preside there, and manage the formality of business, is the lord chancellor, or keeper of the king's great seal, or any other appointed by the king's commission: and if none be so appointed, the house of lords (it is said) may elect. The speaker of the house of commons is chosen by the house; but must be approved by the king. And herein the usage of the two houses differs, that the speaker of the house of commons cannot give his opinion or argue any question in the house; but the speaker of the house of lords, if a lord of parliament, may. In each house the act of the majority binds the whole; and this majority is declared by votes openly and publicly given; not, as at Venice, and many other senatorial assemblies, privately, or by ballot. This latter method may be serviceable, to prevent intrigues and unconstitutional combinations; but is impossible to be practised with us, at least in the house of commons, where every member's conduct is subject to the future censure of his constituents, and therefore should be openly submitted to their inspection.

V. There remains only, in the last place, to add a word or two concerning the manner in which parliaments may be *adjourned*, *prorogued*, or *dissolved*.

An *adjournment* is no more than a continuance of the session from one day to another; as the word itself signifies: and this is done by the authority of each house separately every day; and sometimes for a fortnight or a month together, as at Christmas or Easter, or upon other particular occasions. But the adjournment of one house is no adjournment of the other. It hath also been usual, when his Majesty hath signified his pleasure that both or either of the houses should adjourn themselves to a certain day, to obey the king's pleasure so signified, and to adjourn accordingly. Otherwise, besides the indecorum of a refusal, a prorogation would assuredly follow; which would often be very inconvenient to both public and private business. For prorogation puts an end to the session; and then such bills as are only begun and not perfected, must be resumed *de novo*, (if at all), in a subsequent session; whereas, after an adjournment, all things continue in the same state as at the time of the adjournment made, and may be proceeded on without any fresh commencement.

A *prorogation* is the continuance of the parliament from one session to another; as an adjournment is a continuation of the session from day to day. This is done by the royal authority, expressed either by the lord chancellor in his Majesty's presence, or by commission from the crown, or frequently by proclamation. Both houses are necessarily prorogued at the same time; it not being a prorogation of the house of lords or commons, but of the parliament. The session is never understood to be at an end until a prorogation; though, unless some act be passed, or some judgment given in parliament, it is in truth no session at all. And formerly the usage was, for the king to give the royal assent to all such bills as he approved at the end of every session, and then to prorogue the parliament, though sometimes only for a day or two; after which all business then depending in the houses was to be begun again. Which custom obtained so strongly, that it once became a question, Whether giving the royal assent to a single bill did not of course put an end to the session? And though it was then resolved in the negative, yet the notion was so deeply rooted, that the statute 1 Car. I. c. 7. was passed to declare, that the king's assent to that and some other acts should not put an end to the session; and even so late as the reign of Charles II. we find a proviso frequently tacked to a bill, that his Majesty's assent thereto should not determine the session of parliament. But it now seems to be allowed, that a prorogation must be expressly made, in order to determine the session. And if at the time of an actual rebellion, or imminent danger of invasion, the parliament shall be separated by adjournment or prorogation, the king is empowered to call them together by proclamation, with 14 days notice of the time appointed for their reassembling.

A *dissolution* is the civil death of the parliament; and this may be effected three ways: 1. By the king's will, expressed either in person or by representation. For as the king has the sole right of convening the parliament, so also it is a branch of the royal prerogative, that he may (whenever he pleases) prorogue the parliament for a time, or put a final period to its existence. If nothing had a right to prorogue or dissolve a parliament but itself, it might happen to become perpetual. And this would be extremely dangerous, if at any time it should attempt to encroach upon the executive power; as was fatally experienced by the unfortunate king Charles I.; who, having unadvisedly passed an act to continue the parliament then in being till such time as it should please to dissolve itself, at last fell a sacrifice to that inordinate power which he himself had consented to give them. It is therefore extremely necessary that the crown should be empowered to regulate the duration of these assemblies, under the limitations which the English constitution has prescribed: so that, on the one hand, they may frequently and regularly come together for the dispatch of business and redress of grievances; and may not, on the other, even with the consent of the crown, be continued to an inconvenient or unconstitutional length.

2. A parliament may be dissolved by the demise of the crown. This dissolution formerly happened immediately upon the death of the reigning sovereign; for he being considered in law as the head of the parliament, (*caput, principium, et finis*), that failing, the whole

Parliament whole body was held to be extinct. But the calling a new parliament immediately on the inauguration of the successor being found inconvenient, and dangers being apprehended from having no parliament in being in case of a disputed succession, it was enacted by the statutes 7 & 8 W. III. c. 15. and 6 Ann. c. 7. that the parliament in being shall continue for six months after the death of any king or queen, unless sooner prorogued or dissolved by the successor: that if the parliament be, at the time of the king's death, separated by adjournment or prorogation, it shall notwithstanding assemble immediately: and that if no parliament is then in being, the members of the last parliament shall assemble, and be again a parliament.

3. Lastly, a parliament may be dissolved or expire by length of time. For if either the legislative body were perpetual, or might last for the life of the prince who convened them as formerly, and were so to be supplied, by occasionally filling the vacancies with new representatives; in these cases, if it were once corrupted, the evil would be past all remedy; but when different bodies succeed each other, if the people see cause to disapprove of the present, they may rectify its faults in the next. A legislative assembly also, which is sure to be separated again, (whereby its members will themselves become private men, and subject to the full extent of the laws which they have enacted for others), will think themselves bound, in interest as well as duty, to make only such laws as are good. The utmost extent of time that the same parliament was allowed to sit, by the statute 6 W. & M. c. 3. was *three years*; after the expiration of which, reckoning from the return of the first summons, the parliament was to have no longer continuance. But by the statute 1 Geo. I. st. 2. c. 38. (in order, professedly, to prevent the great and continued expences of frequent elections, and the violent heats and animosities consequent thereupon, and for the peace and security of the government then just recovering from the late rebellion,) this term was prolonged to *seven years*; and, what alone is an instance of the vast authority of parliament, the very same house that was chosen for three years, enacted its own continuance for seven. So that, as our constitution now stands, the parliament must expire, or die a natural death, at the end of every seventh year, if not sooner dissolved by the royal prerogative.

We shall conclude this article with an account of some general forms not taken notice of under any of the above heads.

In the house of lords, the princes of the blood sit by themselves on the sides of the throne; at the wall, on the king's right hand, the two archbishops sit by themselves on a form. Below them, the bishops of London, Durham, and Winchester, and all the other bishops, sit according to the priority of their consecration. On the king's left hand the lord-treasurer, lord president, and lord privy-seal, sit upon forms above all dukes, except the royal blood; then the dukes, marquesses, and earls, according to their creation. Across the room are wool-facks, continued from an ancient custom; and the chancellor, or keeper, being of course the speaker of the house of lords, sits on the first wool-fack before the throne, with the great seal or mace lying by him; below these are forms for the viscounts and barons. On the other wool facks

are seated the judges, masters in chancery, and king's Parliament council, who are only to give their advice in points of law: but they all stand up till the king gives them leave to sit.

The commons sit promiscuously; only the speaker has a chair at the upper end of the house, and the clerk and his assistant sit at a table near him.

When a member of the house of commons speaks, he stands up uncovered, and directs his speech to the speaker only. If what he says be answered by another, he is not allowed to reply the same day, unless personal reflections have been cast upon him: but when the commons, in order to have a greater freedom of debate, have resolved themselves into a committee of the whole house, every member may speak to a question as often as he thinks necessary. In the house of lords they vote, beginning at the pious, or lowest baron, and so up orderly to the highest, every one answering, *Content or Not content*. In the house of commons they vote by *yeas* and *nays*; and if it be dubious which are the greater number, the house divides. If the question be about bringing anything into the house, the *yeas* go out; but if it be about any thing the house already has, the *nays* go out. In all divisions the speaker appoints four tellers, two of each opinion. In a committee of the whole house, they divide by changing sides, the *yeas* taking the right and the *nays* the left of the chair; and then there are but two tellers. If a bill pass one house, and the other demur to it, a conference is demanded in the painted chamber, where certain members are deputed from each house; and here the lords sit covered, and the commons stand bare, and debate the case. If they disagree, the affair is null; but if they agree, this, with the other bills that have passed both houses, is brought down to the king in the house of lords, who comes thither clothed in his royal robes; before him the clerk of the parliament reads the title of each bill, and as he reads, the clerk of the crown pronounces the royal assent or dissent. If it be a public bill, the royal assent is given in these words, *Le roy le veut*, "The king will have it so;" if private, *Soi fait comme il est désiré*, "Let the request be complied with: if the king refuses the bill, the answer is, *Le roy s'aviseira*, "The king will think of it;" and if it be a money-bill, the answer is, *Le roy remercie ses loyaux sujets, accepte leur benevolence, & aussi le veut*: "The king thanks his loyal subjects, accepts their benevolence, and therefore grants his consent."

High Court of PARLIAMENT, is the supreme court in the kingdom, not only for the making, but also for the execution, of laws; by the trial of great and enormous offenders, whether lords or commons, in the method of parliamentary impeachment. As for acts of parliament to attain particular persons of treason or felony, or to inflict pains and penalties, beyond or contrary to the common law, to serve a special purpose, we speak not of them; being to all intents and purposes new laws, made *pro re nata*, and by no means an execution of such as are already in being. But an impeachment before the lords by the commons of Great Britain, in parliament, is a prosecution of the already known and established law, and has been frequently put in practice; being a presentment to the most high and supreme court of criminal jurisdiction by the most solemn grand inquest of the whole kingdom.

Parliament. dom. A commoner cannot, however, be impeached before the lords for any capital offence, but only for high misdemeanors; a peer may be impeached for any crime. And they usually (in case of an impeachment of a peer for treason) address the crown to appoint a lord high steward, for the greater dignity and regularity of their proceedings; which high steward was formerly elected by the peers themselves, though he was generally commissioned by the king; but it hath of late years been strenuously maintained, that the appointment of a high steward in such cases is not indispensably necessary, but that the house may proceed without one. The articles of impeachment are a kind of bills of indictment, found by the house of commons, and afterwards tried by the lords; who are in cases of misdemeanors considered not only as their own peers, but as the peers of the whole nation. This is a custom derived to us from the constitution of the ancient Germans; who in their great councils sometimes tried capital accusations relating to the public: *Licet apud concilium accusare quoque, et discrimen capitis intendere.* And it has a peculiar propriety in the English constitution; which has much improved upon the ancient model imported hither from the continent. For though in general the union of the legislative and judicial powers ought to be most carefully avoided, yet it may happen that a subject, intrusted with the administration of public affairs, may infringe the rights of the people, and be guilty of such crimes as the ordinary magistrate either dares not or cannot punish. Of these the representatives of the people, or house of commons, cannot properly judge; because their constituents are the parties injured, and can therefore only impeach. But before what court shall this impeachment be tried? Not before the ordinary tribunals, which would naturally be swayed by the authority of so powerful an accuser. Reason therefore will suggest, that this branch of the legislature, which represents the people, must bring its charge before the other branch, which consists of the nobility, who have neither the same interests, nor the same passions, as popular assemblies. This is a vast superiority which the constitution of this island enjoys over those of the Grecian or Roman republics; where the people were at the same time both judges and accusers. It is proper that the nobility should judge, to insure justice to the accused; as it is proper that the people should accuse, to insure justice to the commonwealth. And therefore, among other extraordinary circumstances attending the authority of this court, there is one of a very singular nature, which was insisted on by the house of commons in the case of the earl of Danby in the reign of Charles II. and is now enacted by statute 12 & 13 W. III. c. 2. that no pardon under the great seal shall be pleadable to an impeachment by the commons of Great Britain in parliament.

PARLIAMENTS of France, are sovereign courts established by the king, finally to determine all disputes between particular persons, and to pronounce on appeals from sentences given by inferior judges. There are ten of these parliaments in France, of which that of Paris is the chief, its privileges and jurisdiction being of the greatest extent. It consists of six chambers, *v. z.* the grand chamber, where causes of audiences are pleaded; and five chambers of inquest, where procces

are adjudged in writing. This parliament enjoys the privileges of verifying and registering the king's arrests or edicts, without which those edicts are of little or no value.

PARLIAMENT of Sweden, consists of four estates, with the king at their head: These estates are, 1. The nobility and representatives of the gentry; with whom the colonels, lieutenant-colonels, majors, and captains of every regiment, sit and vote. 2. The clergy; one of which body is elected from every rural deanry of ten parishes; who, with the bishops and superintendents, amount to about two hundred. 3. The burglers, elected by the magistrates and council of every corporation as their representatives, of whom there are four for Stockholm, and two for every other town, amounting in the whole to about an hundred and fifty. 4. The peasants, chosen by the peasants out of every district; who choose one of their own rank, and not a gentleman, to represent them: these amount to about two hundred and fifty.

All these generally meet at Stockholm: and after the state-affairs have been represented to them from the throne, they separate, and sit in four several chambers or houses, in each of which affairs are carried on by majority of votes; and every chamber has a negative in the passing any law.

PARMA, an ancient, rich, populous, and handsome town of Italy, capital of the duchy of the same name, with a citadel, a bishop's see, and an university. It has a magnificent cathedral, and the largest opera-house in Europe, which has seats for 8000 people; but as it required a vast number of candles, which occasioned great expence, they have contrived another which has room for 2000 spectators. The dome and the church of St John are painted by the famous Corregio, who was a native of this place. Don Carlos, king of the two Sicilies, carried away the library to Naples, which contained 18,000 volumes, and a very valuable cabinet of curiosities, as also the rich collection of medals. The citadel, which is very near the city, is built in the same taste as that at Antwerp. In 1734 there was a bloody battle fought here; and in 1741, by the treaty of Aix-la-Chapelle, the duchies of Parma, Placentia, and Guastalla, were given to Don Philip, brother to Don Carlos above-mentioned. It is 30 miles south-east of Cremona, and 30 south-east of Milan. E. Long. 10. 51. N. Lat. 44. 50.

PARMA, the duchy of a province of Italy, bounded on the north by the Po; on the north-east, by the Mantuan; on the east, by the duchy of Modena; on the south, by Tuscany; and on the west, by the duchy of Placentia. The air is very wholesome, on which account the inhabitants live to a great age. The soil is very fertile in corn, wine, oil, and hemp; the pastures feed a great number of cattle, and the cheese was in very high esteem. Here are considerable mines of copper and silver, and plenty of truffes, which many are very fond of.

PARMEGIANO, a celebrated painter, whose true name was Francesco Mazzuoli; but he received the former from the city of Parma, where he was born, in 1504. He was brought up under his two uncles, and was an eminent painter when but sixteen years of age. He was famous all over Italy at nineteen; and

Parnassus
Parnassia
Parr.

at twenty-three performed such wonders, that when the general of the emperor Charles V. took Rome by storm, some of the common soldiers having, in taking the town, broke into his apartments, found him intent upon his work, and were instantly so struck with the beauty of his pieces, that instead of involving him in the plunder and destruction in which they were then employed, they resolved to protect him from all manner of violence; which they actually performed. His works are distinguished by the beauty of the colouring, the invention, and drawing. His figures are spirited and graceful, particularly with respect to the choice of attitude, and in their dresses. He also excelled in music, in which he much delighted. His principal works are at Parma, where he lived for several years in great reputation; till unhappily he involved himself in ruin, by spending a considerable part of his time and fortune in search of the philosopher's stone; and died poor in 1540.

There are extant many valuable prints made by this master, not only in chiaro oscuro, but also in etching with aqua-fortis, of which he is said to be the inventor, or at least the first who practised the art of etching in Italy.

PARNASSIA, genus of Parnassus; a genus of the tetragynia order, belonging to the pentandria class of plants. There is but one species, having a stalk about a foot high, angular, and often a little twisted, bearing a single white flower at top. The flowers are very beautifully streaked with yellow; so that though it is a common plant, growing naturally in moist pastures, it is frequently admitted into gardens.

PARNASSUS, (Strabo, Pindar, Virgil), a mountain of Phocis, near Delphi, and the mounts Cithæron and Helicon, with two tops, (Ovid, Lucan); the one called *Cirrba*, sacred to Apollo; and the other, *Nisa*, sacred to Bacchus, (Juvenal). It was covered with bay trees, (Virgil); and originally called *Larnassus*, from Deucalion's larnax or ark, thither conveyed by the flood, (Stephanus, Scholiast on Apollonius); after the flood, *Parnassus*; from Har Nahas, changing the *h* into *p*, the hill of divination or augury, Peuceus; the oracle of Delphi standing at its foot.

PARNELL (Dr Thomas), a very ingenious divine and poet in the early part of this century. He was archdeacon of Clogher, and the intimate friend of Mr Pope; who published his works, with an elegant copy of commendatory verses prefixed. He died in 1718, aged 39.

PARODY, a popular maxim, adage, or proverb.

PARODY, is also a poetical pleasantry, consisting in applying the verses written on one subject, by way of ridicule, to another; or in turning a serious work into a burlesque, by affecting to observe as near as possible the same rhymes, words, and cadences.

PAROLE, in a military sense, the promise made by a prisoner of war, when he has leave to go any where, of returning at a time appointed, if not exchanged.

PAROLE, means also a word given out every day in orders by the commanding officer, both in camp and garrison, in order to know friends from enemies.

PARONOMASIA, in rhetoric, a pun; or a figure

whereby words nearly alike in sound, but of very different meanings, are affectedly or designedly used. See ORATORY, n° 76.

PAROS, (anc. geog.), an island of the Ægean sea, one of the Cyclades, with a strong cognominal town, 38 miles distant from Delos, (Pliny, Nepos). Anciently called *Pasty* and *Minoa*, (Pliny); also *Demetrias*, *Zacynthus*, *Hyria*, *Hylessa*, and *Cabarnis*, (Nicaur). The country of Archilochus, the Iambic poet, (Strabo). An island famous for its white marble, (Virgil, Horace, Ovid), called *hybnites*, because dug with lamps, (Pliny).

PAROTIDES, in anatomy. See there, n° 391.

PAROXYSM, in medicine, the fever fit of a disease, under which it grows higher or exasperated; as of the gout, &c.

PARR (Catharine), was the eldest daughter of Sir Thomas Parr of Kendall. She was first married to John Nevil, lord Latimer; after whose death she got captivated her amorous sovereign, that he raised her to the throne. The royal nuptials were solemnized at Hampton Court on the 12th of July 1543. Being religiously disposed, she was, in the early part of her life, a zealous observer of the Romish rites and ceremonies; but, in the dawning of the Reformation, she became as zealous a promoter of the Lutheran doctrine; yet with such prudence and circumspection as her perilous situation required. Nevertheless, we are told, that she was in great danger of falling a sacrifice to the Popish faction, the chief of whom was bishop Gardiner: he drew up articles against her, and prevailed on the king to sign a warrant to remove her to the Tower. This warrant was, however, accidentally dropped, and immediately conveyed to her majesty. What her apprehensions must have been on this occasion, may be easily imagined. She knew the monarch, and she could not help recollecting the fate of his former queens. A sudden illness was the natural consequence. The news of her indisposition brought the king to her apartment. He was lavish in expressions of affection, and sent her a physician. His majesty being soon after also somewhat indisposed, she prudently returned the visit; with which the king seemed pleased, and began to talk with her on religious subjects, proposing certain questions, concerning which he wanted her opinion. She answered, that such profound speculations were not suited to her sex; that it belonged to the husband to choose principles for his wife; the wife's duty was, in all cases, to adopt implicitly the sentiments of her husband: and as to herself, it was doubly her duty, being blessed with a husband who was qualified, by his judgment and learning, not only to choose principles for his own family, but for the most wife and knowing of every nation. "Not so, by St Mary," replied the king; "you are now become a doctor, Kate, and better fitted to give than receive instruction." She meekly replied, that she was sensible how little she was entitled to these praises; that though she usually declined not any conversation, however sublime, when proposed by his Majesty, she well knew that her conceptions could serve to no other purpose than to give him a little momentary amusement; that she found the conversation a little apt to languish when not revived by some opposition, and

Parr.
Parr.

Parr
|
Parricide.

she had ventured sometimes to feign a contrariety of sentiments, in order to give him the pleasure of refuting her; and that she also proposed, by this innocent artifice, to engage him into topics whence she had observed by frequent experience, that she reaped profit and instruction. "And is it so, sweetheart?" replied the king, "then we are perfect friends again." He embraced her with great affection, and sent her away with assurances of his protection and kindness.

The time being now come when she was to be sent to the Tower, the king, walking in the garden, sent for the queen, and met her with great good humour; when lo the chancellor, with forty of the guards, approached. He fell upon his knees, and spoke softly with the king, who called him knave, arrant knave, beast, fool, and commanded him instantly to depart. Henry then returned to the queen, who ventured to intercede for the chancellor: "Ah poor soul!" said the king, "thou little knowest how evil he deserveth this grace at thy hands. Of my word, sweetheart, he hath been toward thee an arrant knave; and so let him go." The king died in January 1547, just three years and a half after his marriage with this second Catharine; who in a short time was again espoused to Sir Thomas Seymour lord-admiral of England; for, in September 1548, she died in childbirth. The historians of this period generally insinuate, that she was poisoned by her husband, to make way for his marriage with the lady Elizabeth.

That Catharine Parr was beautiful, is beyond a doubt: that she was pious and learned, is evident from her writings: and that her prudence and sagacity were not inferior to her other accomplishments, may be concluded from her holding up the passion of a capricious tyrant as a shield against her enemies; and that at the latter end of his days, when his passions were enfeebled by age, and his peevish austerity increased by disease. She wrote, 1. Queen Catharine Parr's lamentation of a sinner, bewailing the ignorance of her blind life; Lond. 8vo, 1548, 1563. 2. Prayers or meditations, wherein the mynd is stirred patiently to suffer all afflictions here, to set at nought the vaine prosperities of this worlde, and always to long for the everlasting felicity. Collected out of holy workes, by the most virtuous and gracious princeesse Katharine, queene of Englande, France, and Irelande. Printed by John Wayland, 1545, 4to.—1561, 12mo. 3. Other Meditations, Prayers, Letters, &c. unpublished.

PARR (Thomas), or *Old Parr*, a remarkable Englishman, who lived in the reigns of ten kings and queens; married a second wife when he was 120, and had a child by her. See LONGEVITY.

PARRELS, in a ship, are frames made of trucks, ribs, and ropes, which having both their ends fastened to the yards, are so contrived as to go round about the masts, that the yards by their means may go up and down upon the mast. These also, with the breast-ropes, fasten the yards to the masts.

PARRHESIA. See ORATORY, n° 88.

PARRICIDE, the murder of one's parents or children. By the Roman law, it was punished in a much severer manner than any other kind of homicide. After being scourged, the delinquents were sewed up

in a leathern sack, with a live dog, a cock, a viper, and an ape, and so cast into the sea. Solon, it is true, in his laws, made none against parricide; apprehending it impossible that one should be guilty of so unnatural a barbarity. And the Persians, according to Herodotus, entertained the same notion, when they adjudged all persons who killed their reputed parents to be ballards. And upon some such reason as this must we account for the omission of an exemplary punishment for this crime in our English laws; which treat it no otherwise than as simple murder, unless the child was also the servant of the parent.

For though the breach of natural relation is unobserved, yet the breach of civil or ecclesiastic connections, when coupled with murder, denominates it a new offence; no less than a species of treason called *parva proditio*, or *petit treason*: which, however, is nothing else but an aggravated degree of murder; although, on account of the violation of private allegiance, it is stigmatized as an inferior species of treason. And thus, in the ancient Gothic constitution, we find the breach both of natural and civil relations ranked in the same class with crimes against the state and sovereign.

PARROT, in ornithology. See PSITTACUS.

PARSLEY, in botany. See APIUM.

PARSNEF, in botany. See PASTINACA.

PARSON and VICAR. A parson, *persona ecclesiæ*, is one that hath full possession of all the rights of a parochial church. He is called parson, *persona*, because by his person the church, which is an invisible body, is represented; and he is in himself a body corporate, in order to protect and defend the rights of the church (which he personates) by a perpetual succession. He is sometimes called the *rector* or *governor* of the church: but the appellation of *parson* (however it may be depreciated by familiar, clownish, and indiscriminate use) is the most legal, most beneficial, and most honourable title that a parish-priest can enjoy; because such a one (Sir Edward Coke observes) and he only, is said *vicem seu personam ecclesiæ gerere*. A parson has, during his life, the freehold in himself of the parsonage-house, the glebe, the tithes, and other dues. But these are sometimes *appropriated*; that is to say, the benefice is perpetually annexed to some spiritual corporation, either sole or aggregate, being the patron of the living; whom the law esteems equally capable of providing for the service of the church as any single private clergyman.*

Blackston's
Comment.

* See the
article *Appropriation*.

The appropriating corporations, or religious houses, were wont to depute one of their own body to perform divine service, and administer the sacraments, in those parishes of which the society was thus the parson. This officiating minister was in reality no more than a curate, deputy, or viceregent of the appropriator, and therefore called *vicarius*, or "vicar." His stipend was at the discretion of the appropriator, who was, however, bound of common right to find somebody, *qui illi de temporalibus, episcopo de spiritualibus, debeat respondere*. But this was done in so scandalous a manner, and the parishes suffered so much by the neglect of the appropriators, that the legislature was forced to interpose: and accordingly it is enacted, by statute 15 Ric. II. c. 6. that in all appropriations of churches

Parson. churches the diocesan bishop shall ordain (in proportion to the value of the church) a competent sum to be distributed among the poor parishioners annually; and that the vicarage shall be sufficiently endowed. It seems the parish were frequently sufferers, not only by the want of divine service, but also by withholding those alms for which, among other purposes, the payment of tithes was originally imposed: and therefore in this act a pension is directed to be distributed among the poor parochians, as well as a sufficient stipend to the vicar. But he, being liable to be removed at the pleasure of the appropriator, was not likely to insist too rigidly on the legal sufficiency of the stipend; and therefore, by statute 4 Hen. IV. c. 12. it is ordained, that the vicar shall be a secular person, not a member of any religious house; that he shall be vicar perpetual, not removable at the caprice of the monastery; and that he shall be canonically instituted and inducted, and be sufficiently endowed, at the discretion of the ordinary; for these three express purposes, to do divine service, to inform the people, and to keep hospitality. The endowments, in consequence of these statutes, have usually been by a portion of the glebe or land belonging to the parsonage, and a particular share of the tithes, which the appropriators found it most troublesome to collect, and which are therefore generally called *prizes*, or *small tithes*; the greater, or predial tithes, being still reserved to their own use. But one and the same rule was not observed in the endowment of all vicarages. Hence some are more liberally, and some more scantily, endowed: and hence the tithes of many things, as wood in particular, are in some parishes rectorial, and in some vicarial tithes.

The distinction therefore of a parson and vicar is this: The parson has for the most part the whole right to all the ecclesiastical dues in his parish; but a vicar has generally an appropriator over him, entitled to the best part of the profits, to whom he is in effect perpetual curate, with a standing salary. Though in some places the vicarage has been considerably augmented by a large share of the great tithes; which augmentations were greatly assisted by the statute 27 Car. II. c. 8. enacted in favour of poor vicars and curates, which rendered such temporary augmentations (when made by the appropriators) perpetual.

The method of becoming a parson or vicar is much the same. To both there are four requisites necessary; holy orders, presentation, institution, and induction. The method of conferring the holy orders of deacon and priest, according to the liturgy and canons, is foreign to the present purpose; any farther than as they are necessary requisites to make a complete parson or vicar. By common law, a deacon, of any age, might be instituted and inducted to a parsonage or vicarage: but it was ordained, by statute 13 Eliz. c. 12. that no person under twenty-three years of age, and in deacon's orders, should be presented to any benefice with cure; and if he were not ordained priest within one year after his induction, he should be *ipso facto* deprived: and now, by statute 13 and 14 Car. II. c. 4. no person is capable to be admitted to any benefice, unless he hath been first ordained a priest; and then he is, in the language of the law, a clerk in orders. But if he obtains orders, or a licence to preach, by money or corrupt practices, (which seems to be the

true, though not the common, notion of simony), the person giving such orders forfeits 40*l.* and the person receiving, 10*l.* and is incapable of any ecclesiastical preferment for seven years after.

Any clerk may be presented to a parsonage or vicarage; that is, the patron, to whom the advowson of the church belongs, may offer his clerk to the bishop of the diocese to be instituted. But when he is presented, the bishop may refuse him upon many accounts. As, 1. If the patron is excommunicated, and remains in contempt 40 days; or, 2. If the clerk be unfit: which unfitness is of several kinds. First, with regard to his person; as if he be a bastard, an outlaw, an excommunicate, an alien, under age, or the like. Next, with regard to his faith or morals; as for any particular heresy, or vice that is *malum in se*; but if the bishop alleges only in general's, as that he is *schismaticus in veteratui*, or objects a fault that is *malum prohibitum* merely, as haunting taverns, playing at unlawful games, or the like, it is not good cause of refusal. Or, lastly, the clerk may be unfit to discharge the pastoral office for want of learning. In any of which cases, the bishop may refuse the clerk. In case the refusal is for heresy, schism, inability of learning, or other matter of ecclesiastical cognizance, there the bishop must give notice to the patron of such his cause of refusal, who being usually a layman, is not supposed to have knowledge of it; else he cannot present by lapse; but if the cause be temporal, there he is not bound to give notice.

If an action at law be brought by the patron against the bishop for refusing his clerk, the bishop must assign the cause. If the cause be of a temporal nature, and the fact admitted, (as, for instance, outlawry), the judges of the king's courts must determine its validity, or whether it be sufficient cause of refusal: but if the fact be denied, it must be determined by a jury. If the cause be of a spiritual nature, (as heresy, particularly alleged), the fact, if denied, shall also be determined by a jury: and if the fact be admitted or found, the court, upon consultation and advice of learned divines, shall decide its sufficiency. If the cause be want of learning, the bishop need not specify in what points the clerk is deficient, but only allege that he is deficient; for the statute 9 Edw. II. li. 1. c. 13. is express, that the examination of the fitness of a person presented to a benefice belongs to the ecclesiastical judge. But because it would be nugatory in this case to demand the reason of refusal from the ordinary, if the patron were bound to abide by his determination, who has already pronounced his clerk unfit; therefore if the bishop returns the clerk to be *minus sufficiens in literatura*, the court shall write to the metropolitan to re-examine him, and certify his qualifications; which certificate of the archbishop is final.

If the bishop hath no objections, but admits the patron's presentation, the clerk so admitted is next to be instituted by him; which is a kind of investiture of the spiritual part of the benefice; for by institution, the care of the souls of the parish is committed to the charge of the clerk. When a vicar is instituted, he (besides the usual forms) takes, if required by the bishop, an oath of perpetual residence; for the maxim of law is, that *vicarius non habet vicarium*: and as the non-residence of the appropriators was the cause of the perpetual

tual establishment of vicarages, the law judges it very improper for them to defeat the end of their constitution, and by absence to create the very mischief which they were appointed to remedy; especially as, if any profits are to arise from putting in a curate and living at a distance from the parish, the appropriator, who is the real parson, has undoubtedly the elder title to them. When the ordinary is also the patron, and confers the living, the presentation and institution are one and the same act, and are called a *collation to a benefice*. By institution or collation the church is full, so that there can be no fresh presentation till another vacancy, at least in the case of a common patron; but the church is not full against the king till induction: nay, even if a clerk is instituted upon the king's presentation, the crown may revoke it before induction, and present another clerk. Upon institution also the clerk may enter on the parsonage-house and glebe, and take the tithes; but he cannot grant or let them, or bring an action for them, till induction. See INDUCTION.

For the rights of a parson or vicar, in his tithes and ecclesiastical dues, see TITHES. As to his duties, they are so numerous, that it is impracticable to recite them here with any tolerable conciseness or accuracy; but the reader who has occasion may consult *Bp Gibson's Codex*, and *Burn's Ecclesiastical Law*. We shall therefore only just mention the article of residence, upon the supposition of which the law does style every parochial minister an incumbent. By statute 21 Hen. VIII. c. 13. persons willingly absenting themselves from their benefices, for one month together, or two months in the year, incur a penalty of 5 l. to the king, and 5 l. to any person that will sue for the same; except chaplains to the king, or others therein mentioned, during their attendance in the household of such as retain them; and also except all heads of houses, magistrates, and professors in the universities, and all students under forty years of age residing there, *bona fide*, for study. Legal residence is not only in the parish, but also in the parsonage-house; for it hath been resolved, that the statute intended residence, not only for serving the cure and for hospitality, but also for maintaining the house, that the successor also may keep hospitality there.

We have seen that there is but one way whereby one may become a parson or vicar: there are many ways by which one may cease to be so. 1. By death. 2. By cession, in taking another benefice; for by statute 21 Hen. VIII. c. 13. if any one having a benefice of 8 l. *per annum*, or upwards, in the king's books, (according to the present valuation), accepts any other, the first shall be adjudged void, unless he obtains a dispensation; which no one is entitled to have but the chaplains of the king and others therein mentioned, the brethren and sons of lords and knights, and doctors and bachelors of divinity and law, admitted by the universities of this realm. And a vacancy thus made for want of a dispensation, is called *cession*. 3. By consecration; for, as was mentioned before, when a clerk is promoted to a bishopric, all his other preferments are void the instant that he is consecrated. But there is a method, by the favour of the crown, of holding such livings in *commendam*. *Commenda*, or *ecclesia commendata*, is a living commended by the crown

to the care of a clerk, to hold till a proper pastor is provided for it. This may be temporary for one, two, or three years, or perpetual, being a kind of dispensation to avoid the vacancy of the living, and is called a *commenda retinere*. There is also a *commenda recipere*, which is to take a benefice *de novo* in the bishop's own gift, or the gift of some other patron consenting to the same; and this is the same to him as institution and induction are to another clerk. 4. By resignation. But this is of no avail till accepted by the ordinary, into whose hands the resignation must be made. 5. By deprivation, either by canonical censures, or in pursuance of divers penal statutes, which declare the benefice void, for some nonfeasance or neglect, or else some malefeasance or crime: as for simony; for maintaining any doctrine in derogation of the king's supremacy, or of the thirty-nine articles, or of the book of common-prayer; for neglecting after institution to read the liturgy and articles in the church, or make the declarations against popery, or take the abjuration-oath; for using any other form of prayer than the liturgy of the church of England; or for absenting himself 60 days in one year from a benefice belonging to a popish patron, to which the clerk was presented by either of the universities: in all which, and similar cases, the benefice is *ipso facto* void, without any formal sentence of deprivation.

PARSONAGE, a rectory, or parish-church, endowed with a glebe, house, lands, tithes, &c. for the maintenance of a minister, with cure of souls within such parish. See PARSON.

PARSONS, or PERSONS, (Robert), an eminent writer of the church of Rome, was born at Nether-Storey, near Bridgewater, in Somersetshire, in 1546, and educated at Balliol college, Oxford, where he distinguished himself as a zealous Protestant and an acute disputant; but being charged by the society with incontinency and embezzling the college money, he went to Flanders, and declared himself a Catholic. After travelling to several other places, he effected the establishment of the English seminary at Rome, and procured father Allen to be chosen rector of it. He himself was appointed the head of the mission to England, in order to dethrone Queen Elizabeth, and if possible extirpate the Protestant religion. He accordingly came over to this kingdom in 1580, and took some bold steps towards accomplishing his purpose, in which he concealed himself with great art, travelling about the country to gentlemen's houses, disguised in the habit, sometimes of a soldier, sometimes of a gentleman, and at other times like a minister or an apothecary; but father Campian being seized and committed to prison, our author escaped out of England for fear of the same fate, and went to Rome, where he was made rector of the English seminary. He had long entertained the most sanguine hopes of converting to the popish faith the young king of Scots, which he considered as the best and most effectual means of bringing over his subjects to the same religious principles; but finding it impossible to succeed in his design, he published, in 1594, his celebrated book, under the feigned name of *Doleman*, in order to overthrow, as far as lay in his power, the title of that prince to the crown of England. He died at Rome in 1610, and was buried in the chapel of the English college;

Part
Parthia.

Parthia.

2
The
Whence
people.

college. Besides the book already mentioned, he wrote, 1. A defence of the Catholic hierarchy. 2. The liturgy of the sacrament of the mass. 3. A memorial for the Reformation; and several other tracts.

PART, a portion of some whole, considered as divided or divisible.

Aliquot PART, is a quantity which, being repeated any number of times, becomes equal to an integer. Thus 6 is an aliquot part of 24, and 5 an aliquot part of 30, &c.

Aliquant PART, is a quantity which, being repeated any number of times, becomes always either greater or less than the whole. Thus 5 is an aliquant part of 17, and 9 an aliquant part of 10, &c.

The aliquant part is resolvable into aliquot parts. Thus 15, an aliquant part of 20, is resolvable into 10 $\frac{1}{2}$, and 5 a fourth part of the same.

PARTS of speech, in grammar, are all the sorts of words which can enter the composition of a discourse. See GRAMMAR.

PARTERRE, in gardening, a level division of ground, which for the most part faces the south, or best front of a house, and is generally furnished with ever-greens, flowers, &c. There are two kinds of these, the plain ones and the parterres of embroidery.

Plain parterres are most valuable in England, because of the firmness of the English grass turf, which is superior to that of any other part of the world; and the parterres of embroidery are cut into shell and scroll work, with alleys between them. An oblong, or long square, is accounted the most proper figure for a parterre; and a parterre should indeed be always twice as long as it is broad, because, according to the known laws of perspective, a long square always sinks to a square; and an exact square always appears less than it really is. As to the breadth of a parterre, it is to be proportionable to the front of the house; but less than 100 feet in breadth is too little.

There should be on each side the parterre a terrace-walk raised for view, and the flat of the parterre between the terraces should never be more than 300 feet, at the utmost, in breadth, and about 140 feet in width, with twice and a half that in length, is esteemed a very good size and proportion.

PARTHIA, a celebrated empire of antiquity, bounded on the west by Media, on the north by Hyrcania, on the east by Aria, on the south by Carmania the desert; surrounded on every side by mountains, which still serve as a boundary, though its name is now changed, having obtained that of *Eyrac* or *Arak*; and, to distinguish it from Chaldæa, that of *Eyrac Agami*. By Ptolemy it is divided into five districts, viz. Camisine, or Gamisene, Parthyene, Choroane, Atticene, and Tabiene. The ancient geographers enumerate a great many cities in this country. Ptolemy in particular reckons 25 large cities; and it certainly must have been very populous, since we have accounts of 2000 villages, besides a number of cities, in this district being destroyed by earthquakes. Its capital was named *Hecatempolis*, from the circumstance of its having 100 gates. It was a noble and magnificent place; and, according to some, it still remains under the name of *Ispahan*, the capital of the present Persian empire.

Parthia is by some supposed to have been first pro-

pled by the Phetri or Pathri, often mentioned in scripture, and will have the Parthians to be descended from Pathrusim the son of Misraim. But however true this Whence may be with regard to the ancient inhabitants, yet it is certain, that those Parthians who were so famous in history, descended from the Scythians, though from what tribe we are not certainly informed.

The history of the ancient Parthians is totally lost. All that we know about them is, that they were first subject to the Medes, afterwards to the Persians, and lastly to Alexander the Great. After his death the province fell to Seleucus Nicator, and was held by him and his successors till the reign of Antiochus Theus, about the year 250 before Christ. At this time the Parthians revolted, and chose one Arsaces for their king. The immediate cause of this revolt was the lewdness of Agathocles, to whom Antiochus had committed the care of all the provinces beyond the Euphrates. This man made an infamous attempt on Tetricides, a youth of great beauty; which so enraged his brother Arsaces, that he excited his countrymen to revolt; and before Antiochus had leisure to attend to the rebellion, it became too powerful to be crushed. Seleucus Callinicus, the successor of Antiochus Theus, attempted to reduce Arsaces; but the latter having had so much time to strengthen himself, defeated, and drove his antagonist out of the country. Seleucus, however, in a short time, undertook another expedition against Arsaces; but was still more unfortunate than he had been in the former, being not only defeated in a great battle, but taken prisoner, and died in captivity. The day on which Arsaces gained this victory was ever after observed among the Parthians as an extraordinary festival. Arsaces being thus fully established in his new kingdom, reduced Hyrcania, and some other provinces under his power; and was at last killed in a battle against Arearathes IV. king of Cappadocia. From this prince all the other kings of Parthia took the surname of *Arsaces*, as those of Egypt did that of *Ptolemy* from Ptolemy Soter.

Arsaces I. was succeeded by his son Arsaces II. who, entering Media, made himself master of that country, while Antiochus the Great was engaged in a war with Ptolemy Eurgetes king of Egypt. Antiochus, however, was so soon disengaged from that war, than he marched with all his forces against Arsaces, and at first drove him quite out of Media. But he soon returned with an army of 100,000 foot and 20,000 horse, with which he put a stop to the further progress of Antiochus; and a treaty was soon after concluded, in which it was agreed, that Arsaces should remain master of Parthia and Hyrcania, upon condition of his assisting him in his wars with other nations.

Arsaces II. was succeeded by his son Priapatius, who reigned 15 years, and left three sons, Phrahatas, Mithridates, and Artabanus. Phrahatas, the eldest, succeeded to the throne, and reduced under his subjection the Mardi, who had never been conquered by any but Alexander the Great. After him, his brother Mithridates was invested with the regal dignity. He reduced the Bactrians, Medes, Persians, Elymcans, and over-ran in a manner all the east, penetrating beyond the boundaries of Alexander's conquests. Demetrius Nicator, who then reigned in Syria, endeavoured.

3
Cause of the
Parthian re-
volt from
Antiochus
Theus.

4
Conquests
of the Par-
thian mo-
narchs.

1
Ancient di-
visions.

Parthia. voured to recover those provinces; but his army was entirely destroyed, and himself taken prisoner, in which state he remained till his death; after which victory Mithridates made himself master of Babylonia and Mesopotamia, so that he now commanded all the provinces from between the Euphrates and the Ganges.

5
Antiochus Sidetes destroyed with his whole army.

Mithridates died in the 37th year of his reign, and left the throne to his son Phraates II. who was scarce settled in his kingdom, when Antiochus Sidetes marched against him at the head of a numerous army, under pretence of delivering his brother Demetrius, who was still in captivity. Phraates was defeated in three pitched battles, in consequence of which he lost all the countries conquered by his father, and was reduced within the limits of the ancient Parthian kingdom. Antiochus did not; however, long enjoy his good fortune; for his army, on account of their number, amounting to no fewer than 400,000, being obliged to separate to such distances as prevented them, in case of any sudden attack, from joining together, the inhabitants, whom they had most cruelly oppressed, taking advantage of this separation, conspired with the Parthians to destroy them. This was accordingly executed; and the vast army of Antiochus, with the monarch himself, were slaughtered in one day, scarce a single person escaping to carry the news to Syria. Phraates, elated with this success, proposed to invade Syria; but in the mean time, happening to quarrel with the Scythians, he was by them cut off with his whole army, and was succeeded by his uncle Artabanus.

6
Alliance concluded with the Romans.

The new king enjoyed his dignity but a very short time, being, a few days after his accession, killed in another battle with the Scythians. He was succeeded by Pacorus I. who entered into an alliance with the Romans; and he by Phraates III. This monarch took under his protection Tigranes the son of Tigranes the Great, king of Armenia, gave him his daughter in marriage, and invaded the kingdom with a design to place the son on the throne of Armenia; but on the approach of Pompey he thought proper to retire, and soon after solemnly renewed the treaty with the Romans.

7
Cræsus resolves on a war with the Parthians.

Phraates was murdered by his children Mithridates and Orodes; and soon after, the former was put to death by his brother, who thus became sole master of the Parthian empire. In his reign happened the memorable war with the Romans under Cræsus. This was occasioned not by any breach of treaty on the side of the Parthians, but through the shameful avarice of Cræsus. The whole Roman empire at that time had been divided between Cæsar, Pompey, and Cræsus; and by virtue of that partition, the eastern provinces had fallen to the lot of Cræsus. No sooner was he invested with this dignity, than he resolved to carry the war into Parthia, in order to enrich himself with the spoils of that people, who were then looked upon to be very wealthy. Some of the tribunes opposed him, as the Parthians had religiously observed the treaty; but Cræsus having, by the assistance of Pompey, carried every thing before him, left Rome in the year 55 B. C. and pursued his march to Brundisium, where he immediately embarked his troops, though the wind blew very high; and after a difficult passage, where

he lost many of his ships, he reached the ports of Galatia.

Parthia.

8

From Galatia Cræsus hastened to Syria, and passing through Judea, plundered the temple of Jerusalem in his way. He then marched with as great expedition as he could to the river Euphrates, which he crossed on a bridge of boats; and, entering the Parthian dominions, began hostilities. As the enemy had not expected an invasion, they were quite unprepared for resistance, and therefore Cræsus over-ran all Mesopotamia; and if he had taken advantage of the consternation which the Parthians were in, might have also reduced Babylonia. But instead of this, early in the autumn, he repassed the Euphrates, leaving only 7000 foot and 1000 horse to garrison the places he had reduced; and putting his army into winter-quarters in Syria, gave himself totally up to his favourite passion of amassing money.

Early in the spring, the Roman general drew his forces out of their winter-quarters, in order to pursue the war with vigour; but, during the winter, Orodes had collected a very numerous army, and was well prepared to oppose him. Before he entered upon action, however, the Parthian monarch sent ambassadors to Cræsus, in order to expostulate with him on his injustice in attacking an ally of the Roman empire; but Cræsus, without attending to what they said, only returned for answer, that "they should have his answer at Seleucia."

Orodes, finding that a war was not to be avoided, divided his army into two bodies. One he commanded in person, and marched towards Armenia, in order to oppose the king of that country, who had raised a considerable army to assist the Romans. The other he sent into Mesopotamia, under the command of Surena or Surenas, a most experienced general, by whose conduct all the cities which Cræsus had reduced were disheartened. On this some Roman soldiers who made their escape, and fled to the camp of Cræsus, filled the minds of his army with terror at the accounts of the number, power, and strength of the enemy. They told their fellow-soldiers, that the Parthians were very numerous, brave, and well disciplined; that it was impossible to overtake them when they fled, or escape them when they pursued; that their defensive weapons were proof against the Roman darts, and their offensive weapons so sharp, that no buckler was proof against them, &c. Cræsus looked upon all this only as the effects of cowardice; but the common soldiers, and even many of the chief officers, were so disheartened, that Cræsus, the same who afterwards conspired against Cæsar, and most of the legionary tribunes, advised Cræsus to suspend his march, and consider better of the enterprise before he proceeded farther in it. But Cræsus obstinately persisted in his former resolution, being encouraged by the arrival of Artabanus king of Armenia, who brought with him 6000 horse, and promised to send 10,000 cuirassiers and 30,000 foot, whenever he should stand in need of them. At the same time, he advised him by no means to march his army through the plains of Mesopotamia, but to take his route over the mountains of Armenia. He told him, that as Armenia was a mountainous country, the enemy's cavalry, in which their main strength consisted, would there be entirely use-

9
His soldiers were disheartened.

Parthia.

Parthia.

useful; and besides, his army would there be plentifully supplied with all manner of necessaries: whereas, if he marched by the way of Mesopotamia, he would be perpetually harassed by the Parthian horse, and frequently be obliged to lead his army thro' sandy deserts, where he would be distressed for want of water and all other provisions. This salutary advice, however, was rejected, and Crassus entered Mesopotamia with an army of about 40,000 men.

The Romans had no sooner crossed the Euphrates, than Cassius advised his general to advance to some of those towns in which the garrisons yet remained, in order to halt and refresh his troops; or if he did not choose to follow this advice, he said that his best way would be to march along the banks of the Euphrates to Seleucia; as by this method he would prevent the Parthians from surrounding him, at the same time that he would be plentifully supplied with provisions from his ships. Of this advice Crassus seemed to approve; but was dissuaded by Abgarus king of Edessa, whom the Romans took for an ally, but who was in reality a traitor sent by Surenas to bring about the destruction of the Roman army.

to
Betrayed by
Abgarus
king of E-
dessa.

Under the conduct of this faithless guide, the Romans entered a vast green plain divided by many rivulets. Their march proved very easy through this fine country; but the farther they advanced, the worse the roads became, inasmuch, that they were at last obliged to climb up rocky mountains, which brought them to a dry and sandy plain, where they could neither find food to satisfy their hunger, nor water to quench their thirst. Abgarus then began to be suspected by the tribunes and other officers, who earnestly intreated Crassus not to follow him any longer, but to retreat to the mountains; at the same time an express arrived from Artabazus, acquainting the Roman general that Orodes had invaded his dominions with a great army, and that he was obliged to keep his troops at home, in order to defend his own dominions. The same messenger advised Crassus in his master's name to avoid by all means the barren plains, where his army would certainly perish with hunger and fatigue, and by all means to approach Armenia, that they might join their forces against the common enemy. But all was to no purpose; Crassus, instead of hearkening either to the advice of the king or his own officers, first flew into a violent passion with the messengers of Artabazus, and then told his troops, that they were not to expect the delights of Campania in the most remote parts of the world.

Thus they continued their march for some days across a desert, the very sight of which was sufficient to throw them into the utmost despair; for they could not perceive, either near them or at a distance, the least tree, plant, or brook, not so much as an hill, or a single blade of grass; nothing was to be seen all around them, but huge heaps of burning sand. The Romans had scarcely got thro' this desert, when word was brought them by their scouts, that a numerous army of Parthians was advancing full march to attack them; for Abgarus, under pretence of going out on parties, had often conferred with Surenas, and concerted measures with him for destroying the Roman army. Upon this advice, which occasioned great confusion in the camp, the Romans being quite exhausted and ti-

red out with their long and troublesome march, Crassus drew up his men in battalia, following at first the advice of Cassius, who was for extending the infantry as wide as possible, that they might take up the more ground, and by that means prevent the enemy from surrounding them; but Abgarus assuring the proconsul, that the Parthian forces were not so numerous as was represented, he changed this disposition, and believing only the man who betrayed him, drew up his troops in a square, which faced every way, and had on each side 12 cohorts in front. Near each cohort, he placed a troop of horse to support them, that they might charge with the greater security and boldness. Thus the whole army looked more like one phalanx, than troops drawn up in manipuli, with spaces between them, after the Roman manner. The general himself commanded in the centre, his son in the left wing, and Cassius in the right.

In this order they advanced to the banks of a small river called the *Balifus*, the sight of which was very pleasing to the soldiers, who were much harassed with drought and excessive heat. Most of the officers were for encamping on the banks of this river, or rather rivulet, to give the troops time to refresh themselves after the fatigues of so long and painful a march; and, in the mean time, to procure certain intelligence of the number and disposition of the Parthian army; but Crassus, suffering himself to be hurried on by the inconsiderate ardour of his son, and the horse he commanded, only allowed the legions to take a meal standing; and before this could be done by all, he ordered them to advance, not slowly, and halting now and then, after the Roman manner, but as fast as they could move, till they came in sight of the enemy, who, contrary to their expectation, did not appear either so numerous or so terrible as they had been represented; but this was a stratagem of Surenas, who had concealed his men in convenient places, ordering them to cover their arms, lest their brightness should betray them, and, starting up at the first signal, to attack the enemy on all sides. The stratagem had the desired effect; for Surenas no sooner gave the signal, than the Parthians, rising as it were out of the ground, with dreadful cries, and a most frightful noise, advanced against the Romans, who were greatly surprised and dismayed at that sight; and much more so, when the Parthians, throwing off the covering of their arms, appeared in shining cuirasses, and helmets of burnished steel, finely mounted on horses covered all over with armour of the same metal. At their head appeared young Surenas, in a rich dress, and was the first who charged the enemy, endeavouring, with his pikemen, to break through the first ranks of the Roman army; but finding it too close and impenetrable, the cohorts supporting each other, he fell back, and retired in a seeming confusion; but the Romans were much surprised when they saw themselves suddenly surrounded on all sides, and galled with continual showers of arrows. Crassus ordered his light-armed foot and archers to advance, and charge the enemy; but they were soon repulsed, and forced to cover themselves behind the heavy-armed foot. Then the Parthian horse, advancing near the Romans, discharged showers of arrows upon them, every one of which did execution, the legionaries being drawn up in such

the battle
of Carthage.

close

close order, that it was impossible for the enemy to misfire their aim. As their arrows were of an extraordinary weight, and discharged with incredible force and impetuosity, nothing was proof against them. The two wings advanced in good order to repulse them, but to no effect; for the Parthians shot their arrows with as great dexterity when their backs were turned, as when they faced the enemy; so that the Romans, whether they kept their ground, or pursued the flying enemy, were equally annoyed with their fatal arrows.

The Romans, as long as they had any hopes that the Parthians, after having spent their arrows; would either betake themselves to flight, or engage them hand to hand, stood their ground with great resolution and intrepidity; but when they observed, that there were a great many camels in their rear, loaded with arrows, and that those who emptied their quivers wheeled about to fill them anew, they began to lose courage, and loudly to complain of their general for suffering them thus to stand still, and serve only as a butt to the enemy's arrows, which, they well saw, would not be exhausted till they were all killed to a man. Hereupon Crassus ordered his son to advance, at all adventures, and attack the enemy with 1300 horse, 500 archers, and 8 cohorts. But the Parthians no sooner saw this choice body (for it was the flower of the army) marching up against them, but they wheeled about, and betook themselves, according to their custom, to flight. Hereupon young Crassus, crying out as loud as he could, *They fly before us*, pushed on full speed after them, not doubting but he should gain a complete victory; but, when he was at a great distance from the main body of the Roman army, he perceived his mistake; for those who before had fled, facing about, charged him with incredible fury. Young Crassus ordered his troops to halt, hoping that the enemy, upon seeing their small number, would not be afraid to come to a close fight; but herein he was likewise greatly disappointed; for the Parthians, contenting themselves to oppose his front with their heavy-armed horse, surrounded him on all sides; and, keeping at a distance, discharged incessant showers of arrows upon the unfortunate Romans, thus surrounded and pent up. The Parthian cavalry, in wheeling about, raised so thick a dust, that the Romans could scarce see one another, much less the enemy: nevertheless, they found themselves wounded, with arrows, tho' they could not perceive whence they came. In a short time, the place where they stood was all strown with dead bodies.

Some of the unhappy Romans finding their entrails torn, and many overcome by the exquisite torments they suffered, rolled themselves on the sand with the arrows in their bodies, and expired in that manner. Others endeavouring to tear out by force the bearded points of the arrows, only made the wounds the larger and increased their pain. Most of them died in this manner; and those who outlived their companions were no more in a condition to act; for when young Crassus exhorted them to march up to the enemy, some shewed him their wounded bodies, others their hands nailed to their bucklers, and some their feet pierced through and pinned to the ground: so that it was equally impossible for them either to attack the enemy

or defend themselves. The young commander, therefore, leaving his infantry to the mercy of the enemy, advanced at the head of the cavalry against their heavy-armed horse. The thousand Gauls whom he had brought with him from the west, charged the enemy with incredible boldness and vigour; but their lances did little execution on men armed with cuirasses, and horses covered with tried armour: however, they behaved with great resolution; for some of them taking hold of the enemies spears, and clofing with them, threw them off their horses on the ground, where they lay without being able to stir, by reason of the great weight of their armour; others dismounting, crept under the enemy's horses, and thrusting their swords into their bellies, made them throw their riders. Thus the brave Gauls fought, tho' greatly harrassed with heat and thirst, which they were not accustomed to bear, till most of their horses were killed, and their commander dangerously wounded. They then thought it advisable to retire to their infantry, which they no sooner joined, than the Parthians invested them anew, making a most dreadful havoc of them with their arrows. In this desperate condition, Crassus, spying a rising ground at a small distance, led the remains of his detachment thither, with a design to defend himself in the best manner he could, till succours should be sent him from his father. The Parthians pursued him; and having surrounded him in his new post, continued showering arrows upon his men, till most of them were either killed or disabled, without being able to make use of their arms, or give the enemy proofs of their valour.

Young Crassus had two Greeks with him, who had settled in the city of Carrhæ. These, touched with compassion, at seeing so brave a man reduced to such straits, pressed him to retire with them to the neighbouring city of Iſſhnes, which had declared for the Romans; but the young Roman rejected their proposal with indignation, telling them, that he would rather die a thousand times than abandon so many valiant men, who sacrificed their lives for his sake. Having returned this answer to his two Greek friends, he embraced and dismissed them, giving them leave to retire and shift for themselves in the best manner they could. As for himself, having now lost all hopes of being relieved, and seeing most of his men and friends killed round him, he gave way to his grief; and, not being able to make use of his arm, which was shot thro' with a large barbed arrow, he presented his side to one of his attendants, and ordered him to put an end to his unhappy life. His example was followed by Censorius, a senator, by Megabacchus, an experienced and brave officer, and by most of the nobility who served under him. Five hundred common soldiers were taken prisoners, and the rest cut in pieces.

The Parthians, having thus cut off or taken the whole detachment commanded by young Crassus, marched without delay against his father, who, upon the first advice that the enemy fled before his son, and were closely pursued by him, had taken heart, the more because those who had remained to make head against him, seemed to abate much of their ardour, the greatest part of them having marched with the rest against his son. Wherefore, having encouraged his troops,

13
The death
of young
Crassus.

22
Extremity
of the
Romans.

Parthia. troops, he had retired to a small hill in his rear, to wait there till his son returned from the pursuit. Young Crassus had dispatched frequent expresses to his father, to acquaint him with the danger he was in; but they had fallen into the enemy's hands, and been by them put to the sword: only the last, who had escaped with great difficulty, arrived safe, and informed him that his son was lost if he did not send him an immediate and powerful reinforcement. This news threw Crassus into the utmost consternation; a thousand affecting thoughts rose in his mind, and disturbed his reason to such a degree, that he scarce knew what he was doing. However, the desire he had of saving his son, and so many brave Romans who were under his command, made him immediately decamp, and march to their assistance; but he was not gone far before he was met by the Parthians, who, with loud shouts, and songs of victory, gave, at a distance, the unhappy father notice of his misfortune. They had cut off young Crassus's head, and, having fixed it on the point of a lance, were advancing full speed to fall on the father. As they drew near, Crassus was struck with that dismal and affecting sight; but, on this occasion, behaved like an hero: for tho' he was under the deepest concern, he had the presence of mind to stifle his grief, for fear of discouraging the army, and to cry out to the dismayed troops, "This misfortune is entirely mine; the loss of one man cannot affect the victory. Let us charge, let us fight like Romans: if you have any compassion for a father who has just now lost a son whose valour you admired, let it appear in your rage and resentment against these insulting barbarians." Thus Crassus strove to reanimate his troops; but his efforts were unsuccessful: their courage was quite sunk, as appeared from the faint and languishing shout which they raised, according to custom, before the action. When the signal was given, the Parthians, keeping to their old way of fighting, discharged clouds of arrows on the legionaries, without drawing near them; which did such dreadful execution, that many of the Romans, to avoid the arrows, which occasioned a long and painful death, threw themselves, like men in despair, on the enemy's heavy-armed horse, seeking from their spears a more quick and easy kind of death. Thus the Parthians continued plying them incessantly with their arrows till night, when they left the field of battle, crying out, that they would allow the father one night to lament the death of his son.

¹⁴ Distress of Crassus. This was a melancholy night for the Romans. Crassus kept himself concealed from the soldiery, lying not in the general's tent, but in the open air, and on the bare ground, with his head wrapped up in his paludamentum or military cloak: and was, in that forlorn condition, says Plutarch, a great example to the vulgar, of the infallibility of fortune; to the wife, a still greater of the pernicious effects of avarice, temerity, and ambition. Octavius, one of his lieutenants, and Cassius, approached him, and endeavoured to raise him up and console him: but, seeing him quite sunk under the weight of his affliction, and deaf to all comfort, they summoned a council of war, composed of all the chief officers; wherein it was unanimously resolved, that they should decamp before break of day, and retire, without sound of trumpet, to the neigh-

bouring city of Carrhæ, which was held by a Roman garrison. Agreeable to this resolution, they began their march as soon as the council broke up; which produced dreadful outcries among the sick and wounded, who, perceiving that they were to be abandoned to the mercy of the enemy, filled the camp with their complaints and lamentations: but their cries and tears, though very affecting, did not stop the march of the others, which, indeed, was very slow, to give the stragglers time to come up. There were only 300 light horse, under the command of one Ægnatius, who pursued their march, without stopping. These arriving at Carrhæ about midnight, Ægnatius, calling to the centinels on the walls, desired them to acquaint Coponius, governor of the place, that Crassus had fought a great battle with the Parthians; and, without saying a word more, or letting them know who he was, continued his march with all possible expedition to the bridge of Zeugma; which he passed, and by that means saved his troops, but was much blamed for abandoning his general.

However, the message sent to Coponius was of some temporary service to Crassus. For that commander, wisely conjecturing, from the manner in which the unknown person had given him that intelligence, that some misfortune had befallen Crassus, immediately ordered his garrison to stand to their arms; and, marching out, met Crassus, and conducted him and his army into the city: for the Parthians, tho' informed of his flight, did not offer to pursue him, observing therein the superstitious custom which obtained among them and the Persians, not to fight in the night; but, when it was day, they entered the Roman camp, and, having put all the wounded, to the number of 4000, to the sword, dispersed their cavalry all over the plain, in pursuit of the fugitives. One of Crassus's lieutenants, named *Vargunteius*, having separated in the night from the main body of the army, with four cohorts, missed his way, and was overtaken by the enemy; at whose approach he withdrew to a neighbouring hill, where he defended himself with great valour, till all his men were killed, except 20, who made their way through the enemy sword in hand, and got safe to Carrhæ: but *Vargunteius* himself lost his life on this occasion.

¹⁵ Surenas pretends to confer with Crassus. In the mean time Surenas, not knowing whether Crassus and Cassius had retired to Carrhæ, or chosen a different route; in order to be informed of the truth, and take his measures accordingly, dispatched a messenger, who spoke the Roman language, to the city of Carrhæ, enjoining him to approach the walls, and acquaint Crassus himself, or Cassius, that the Parthian general was inclined to enter into a treaty with them, and demanded a conference. Both the proconsul and his quæstor Cassius spoke from the walls with the messenger; and, accepting the proposal with great joy, desired that the time and place for an interview might be immediately agreed upon. The messenger withdrew, promising to return quickly with an answer from Surenas: but that general no sooner understood that Crassus and Cassius were in Carrhæ, than he marched thither with his whole army; and, having invested the place, acquainted the Romans, that, if they expected any favourable terms, they must deliver up Crassus and Cassius to him in chains. Hereupon a council of the

Parthia.

chief officers being summoned, it was thought expedient to retire from Carrhæ that very night, and seek for another asylum. It was of the utmost importance, that none of the inhabitants of Carrhæ should be acquainted with their design till the time of its execution; but Crassus, whose whole conduct evidently shewed that he was blinded, as Dio Cassius observes, by some deity, imparted the whole matter in confidence to one Andromachus, choosing him for his guide, and relying injudiciously on the fidelity of a man whom he scarce knew. Andromachus immediately acquainted Surenas with the design of the Romans; promising at the same time, as the Parthians did not engage in the night, to manage matters so, that they should not get out of his reach before day-break. Pursuant to his promise, he led them through many windings and turnings, till he brought them into deep marshy grounds, where the infantry were up to the knees in mire. Then Cassius, suspecting that their guide had led them into those bogs with no good design, refused to follow him any longer; and, returning to Carrhæ, took his route towards Syria, which he reached with 500 horse. Octavius, with 5000 men under his command, being conducted by trusty guides, gained the mountains called by Plutarch and Appian *Sinnaci*, and there intrenched himself before break of day.

As for Crassus, he was still entangled in the marshes, when Surenas, at the rising of the sun, overtook him, and invested him with his cavalry. The proconsul had with him four cohorts, and a small body of horse; and with these he gained, in spite of all opposition, the summit of another hill within 12 furlongs of Octavius; who, seeing the danger that threatened his general, flew to his assistance, first with a small number of his men, but was soon followed by all the rest, who, being ashamed of their cowardice, quitted their post, tho' very safe, and, charging the Parthians with great fury, disengaged Crassus, and obliged the enemy to abandon the hill. Upon the retreat of the enemy, they formed themselves into an hollow square; and placing Crassus in the middle, made a kind of rampart round him with their bucklers, resolutely protesting, that none of the enemy's arrows should touch their general's body, till they were all killed fighting in his defence. Surenas, loth to let so fine a prey escape, surrounded the hill, as if he designed to make a new attack: but, finding his Parthians very backward, and not doubting but the Romans, when night came on, would pursue their march, and get out of his reach, he had recourse again to artifice; and declared before some prisoners, whom he soon after set at liberty, that he was inclined to treat with the proconsul of a peace; and that it was better to come to a reconciliation with Rome, than to sow the seeds of an eternal war, by shedding the blood of one of her generals.

Agreeable to this declaration, Surenas, as soon as the prisoners were released, advanced towards the hill where the Romans were posted, attended only by some of his officers, and, with his bow unbent, and open arms, invited Crassus to an interview. So sudden a change seemed very suspicious to the proconsul; who therefore declined the interview, till he was forced, by his own soldiers, to intrust his life with an enemy

whose treachery they had all experienced; for the legionaries flocking round him, not only abused him in an outrageous manner, but even menaced him if he did not accept of the proposals made him by the Parthian general. Seeing, therefore, that his troops were ready to mutiny, he began to advance, without arms or guards, towards the enemy, after having called the gods and his officers to witness the violence his troops offered him; and intreated all who were present, but especially Octavius and Petronius, two of the chief commanders, for the honour of Rome their common mother, not to mention, after his death, the shameful behaviour of the Roman legionaries. Octavius and Petronius could not resolve to let him go alone; but attended him down the hill, as did likewise some legionaries, keeping at a distance. Crassus was met at the foot of the hill by two Greeks; who, dismounting from their horses, saluted him with great respect; and desired him, in the Greek tongue, to send some of his attendants, who might satisfy him, that Surenas, and those who were with him, came without arms. Hereupon Crassus sent two brothers, of the Rolsian family; but Surenas, having caused them to be seized, advanced to the foot of the hill, mounted on a fine horse, and attended by the chief officers of his army. Crassus, who waited for the return of his two messengers, was surprised to see himself prevented by Surenas in person, when he least expected it. The Parthian general, perceiving, as he approached Crassus, that he was on foot, cried out, in a seeming surprise, "What do I see? a Roman general on foot, and we on horseback! Let an horse be brought for him immediately." "You need not be surprised, (replied Crassus;) we are come only to an interview, each after the custom of his country." "Very well, (answered Surenas;) there shall be henceforth a lasting peace between king Orodes and the people of Rome: but we must sign the articles of it on the banks of the Euphrates; for you Romans do not always remember your conventions." Crassus would have sent fort an horse: but a very stately one, with a golden bit, and richly caparisoned, was brought to him by a Parthian; which Surenas presenting to him, "Accept this horse from my hands, (said he,) which I give you in the name of my master king Orodes." He had scarce uttered these words, when some of the king's officers, taking Crassus by the middle, set him upon the horse, which they began to whip with great violence before them in order to make him quicken his pace. Octavius, offended at this insult, took the horse by the bridle; Petronius, and the few Romans who were present, seconded him, and flocking all round Crassus, stopped his horse. The Parthians endeavoured to repulse them, and clear the way for the proconsul; whereupon they began to justify and push one another with great tumult and disorder. At last, Octavius, drawing his sword, killed one of the king's grooms; but, at the same time, another coming behind Octavius, with one blow laid him dead at his feet. Both Crassus. parties fought with great resolution, the Parthians striving to carry off Crassus, and the Romans to rescue him out of their hands. In this scuffle most of the Romans who came to the conference were killed; and, among the rest, Crassus himself, but whether by a Roman or a Parthian is uncertain.

Parthia.

Parthia.

Upon his death, the rest of the army either surrendered to the enemy, or, dispersing in the night, were pursued, and put to the sword. The Romans lost in this campaign at least 30,000 men; of which 20,000 were killed, and 10,000 taken prisoners.

When the battle of Carrhæ was fought, king Orodes was in Armenia, where he had made peace with Artabazus. While the two kings were solemnizing their new alliance with expensive and public feasts, Syllaces, or Syllaces, a Parthian officer, whom Surenas had sent with the news of his late victory, and the head of Crassus as a proof of it, arrived in the capital of Armenia. The transports of joy which Orodes felt at this sight, and these news, are not to be expressed; and the lords of both kingdoms, who attended their sovereigns, raised loud and repeated shouts of joy. Syllaces was ordered to give a more particular and distinct account of that memorable action: which when he had done, Orodes commanded melted gold to be poured into Crassus's mouth; reproaching him thereby with avarice, which had been always his predominant passion.

²⁸ Surenas put victory; for Orodes, jealous of his power and authority among the Parthians, soon after caused him to be put to death. Pacorus, the king's favourite son, was put at the head of the army; and, agreeable to his father's directions, invaded Syria: but he was driven out from thence with great loss by Cicero and Cassius, the only general who survived the defeat of Crassus. After this we find no mention of the Parthians, till the time of the civil war between Cæsar and Pompey, when the latter sent ambassadors to solicit succour against his rival. This Orodes was willing to grant, upon condition that Syria was delivered up to him; but as Pompey would not consent to such a proposal, the succours were not only denied, but, after the battle of Pharsalia, he put Lucius Hirtius in irons, whom Pompey had again sent to ask assistance, or at least to desire leave to shelter himself in the Parthian dominions.

²⁹ War commenced against the Parthians by Mark Anthony.

Cæsar is said to have meditated a war against the Parthians, which in all probability would have proved fatal to them. His death delivered them from this danger. But, not long after, the eastern provinces, being grievously oppressed by Mark Anthony, rose up in arms; and having killed the tax-gatherers, invited the Parthians to join them, and drive out the Romans. They very readily accepted the invitation, and crossed the Euphrates with a powerful army under the command of Pacorus and Labienus a Roman general of Pompey's party. At first they met with great success, over-ran all Asia Minor, and reduced all the countries as far as the Hellespont and the Egean Sea, subduing likewise Phœnicia, Syria, and even Judæa. They did not however long enjoy their new conquests: for being elated with their victories, and despising the enemy, they engaged Ventidius, Anthony's lieutenant, before Labienus had time to join them, and were utterly defeated. This so disheartened Labienus's army, that they all abandoned him; and he himself, being thus obliged to wander from place to place in disguise, was at last taken and put to death at Cyprus. Ventidius pursuing his advantage, gained several other victories;

and at last entirely defeated the Parthian army under Pacorus, cutting almost the whole of them in pieces, and the prince himself among the rest. He did not, however, pursue this last victory as he might have done; being afraid of giving umbrage to Anthony, who had already become jealous of the great honour gained by his lieutenant. He therefore contented himself with reducing those places in Syria and Phœnicia which the Parthians had taken in the beginning of the war, until Anthony arrived to take the command of the army upon himself.

Parthia.

20

Pacorus defeated and killed by Ventidius.

Orodes was almost distracted with grief on receiving the dreadful news of the loss of his army and the death of his favourite son. However, when time had restored the use of his faculties, he appointed Phraates, the eldest, but the most wicked, of all his children, to succeed him in the kingdom, admitting him at the same time to a share of the sovereign authority with himself. The consequence of this was, that Phraates very soon attempted to poison his father with hemlock. But this, contrary to expectation, proving a cure for the dropsy, which an excess of grief had brought upon the king, the unnatural son had him stifled in bed; and soon after not only murdered all his own brethren, who were 30 in number, but cut off all the rest of the royal family, not sparing even his own eldest son, left the discontented Parthians should place him, as he was already of age, on the throne.

²¹ Orodes murdered.

Many of the chief lords of Parthia, being intimidated by the cruelty of Phraates, retired into foreign countries; and among these was one Monæses, a person of great distinction, as well as skill and experience in war. This man, having fled to Anthony, soon gained his confidence, and was by him easily prevailed upon to engage in a war against his countrymen. But Phraates, justly dreading the consequences of such a person's defection, sent a solemn embassy to invite him home on such terms as he should think fit to accept: which greatly provoked Anthony; though he did not hinder him from returning, lest others should thereby be discouraged from coming over to him. He therefore dismissed him with great civility, sending ambassadors at the same time to Phraates to treat of a peace. Thus he hoped to divert the Parthian monarch's attention from making the necessary preparations for war, and that he should be able to fall upon him in the spring when he was in no condition to make resistance. But herein he was greatly disappointed; for, on his arrival at the Euphrates, which he intended to pass, and enter the Parthian dominions on that side, he found all the passes so well guarded, that he thought proper to enter Media, with a design first to reduce that country, and then to enter Parthia.

This plan had been suggested to him by Artabazus king of Armenia, who in the end betrayed him; for, instead of conducting the army the straight way from Zeugma on the Euphrates, to the Araxes which parted Media from Armenia, and which was about 500 miles distant from the place whence he first set out, Artabazus led them over rocks and mountains so far about, that the army had marched above 1000 miles before they reached the borders of Media, where they intended to begin the war. Thus they were not only greatly fatigued, but had not sufficient time, the year being far spent, to put in execution the design on

²² Anthony king of Armenia, who in the end betrayed him; for, instead of conducting the army the straight way from Zeugma on the Euphrates, to the Araxes which parted Media from Armenia, and which was about 500 miles distant from the place whence he first set out, Artabazus led them over rocks and mountains so far about, that the army had marched above 1000 miles before they reached the borders of Media, where they intended to begin the war. Thus they were not only greatly fatigued, but had not sufficient time, the year being far spent, to put in execution the design on

Parthia. which they had come. However, as Anthony was impatient to get back to Cleopatra, he left behind him most of the baggage of the army, and 300 wagons loaded with battering rams and other military engines for sieges; appointing Statianus, one of his lieutenants, with a body of 10,000 men, to guard them, and to bring them, by slower marches, after the army. With the rest of the forces he marched more than 300 miles before the rest, without allowing his men any reprieve till he arrived at Praespa, or Phrahata, the capital of Media, which he immediately invested. But the Parthians, well knowing that he could not make any progress without his military machines, passed by his army, in order to attack Statianus; which they did with such success, that the body commanded by him were all to a man cut off, and all their military engines taken, among which was a battering ram 80 feet long.

23
Ten thousand
Romans cut
off.

Anthony, notwithstanding this disaster, continued the siege of Praespa; but was daily harassed by sallies of the garrison from within, and the enemy's army without. At last he began to think of a retreat when his provisions were almost exhausted, finding it impossible to become master of the city. But as he was to march 300 miles through the enemy's country, he thought proper first to send ambassadors to the Parthian monarch, acquainting him that the Roman people were willing to allow him a peace, provided he would restore the standards and prisoners taken at Carrhae. Phrahates received the ambassadors, sitting on a golden throne; and, after having bitterly inveighed against the avarice and unbounded ambition of the Romans, told them that he would not part with the standards and prisoners; but that, if Antony would immediately raise the siege of Praespa, he would suffer him to retire unmolested.

24
Anthony
leaves Par-
thia in great
distress.

Anthony, who was reduced to great straits, no sooner received this answer, than he broke up the siege, and marched towards Armenia. However, Phrahates was not so good as his word; for the Romans were attacked by the enemy no fewer than 18 times on their march, and were thrice in the utmost danger of being cut off. A famine also raged in the Roman army; upon which they began to desert to the enemy; and indeed Anthony would probably have been left by himself, had not the Parthians, in a very cruel as well as impolitic manner, murdered all those who fled to them in sight of the rest. At last, after having lost 32,000 men, and being reduced to such despair that he was with difficulty prevented from laying violent hands on himself, he reached the river Araxes; when his men, finding themselves out of the reach of the enemy, fell down on the ground, and kissed it with tears of joy.

Anthony was no sooner gone, than the kings of Media and Parthia quarrelled about the booty they had taken; and after various contests, Phrahates reduced all Media and Armenia. After this, being elated with his conquests, he oppressed his subjects in such a cruel and tyrannical manner, that a civil war took place; in which the competitors were alternately driven out and restored, till the year 50, when one Vologeses, the son of Gotarzes, a former king, became peaceable possessor of the throne. He carried on some wars against the Romans, but with very indifferent success, and at

last gladly consented to a renewal of the ancient treaties with that powerful people.

From this time the Parthian history affords nothing remarkable till the reign of the emperor Trajan; when, ²⁵by the Parthian king, by name *Coldroes*, ^{Parthia sub-}infringed the ^{Trajan.}treaty with Rome, by driving out the king of Armenia. Upon this Trajan, who was glad of any pretence to quarrel with the Parthians, immediately hastened into Armenia. His arrival there was so sudden and unexpected, that he reduced almost the whole country without opposition; and took prisoner Parthamaspis, the king whom the Parthians had set up. After this he entered Mesopotamia, took the city of Nisibis, and reduced to a Roman province the whole of that wealthy country.

Early in the spring of the following year, Trajan, who had kept his winter-quarters in Syria, took the field again; but was warmly opposed by Coldroes. He found him encamped on the banks of the Euphrates, with a design to dispute his passage: which he did with such vigour, that the emperor, after having several times attempted to ford that river, and been always repulsed with great slaughter, was obliged to cause boats to be built on the neighbouring mountains, which he privately conveyed from thence on carriages to the water-side; and having in the night-time formed a bridge with them, he passed his army the next day; but not without great loss and danger, the Parthians harassing his men the whole time with incessant showers of arrows, which did great execution. Having gained the opposite bank, he advanced boldly into Assyria, the Parthians flying every where before him, and made himself master of Arbela. Thence he pursued his march; subduing, with incredible rapidity, countries where the Roman standard had never been displayed before. Babylonia, or the province of Babylon, voluntarily submitted to him. The city itself was, after a vigorous resistance, taken by storm; by which means he became master of all Chaldea and Assyria, the two richest provinces of the Parthian empire. From Babylon he marched to Ctesiphon, the metropolis of the Parthian monarchy; which he besieged, and at last reduced. But as to the particulars of these great conquests, we are quite in the dark; this expedition, however glorious to the Roman name, being rather hinted at, than described, by the writers of those times. While Trajan was thus making war in the heart of the enemy's country, Coldroes, having recruited his army, marched into Mesopotamia, with a design to recover that country, and cut off all communication between the Roman army and Syria. On his arrival in that province, the inhabitants flocked to him from all parts; and most of the cities, driving out the garrisons left by Trajan, opened their gates to him. Hereupon the emperor detached Lucius and Maximus, two of his chief commanders, into Mesopotamia, to keep such cities in awe as had not revolted, and to open a communication with Syria. Maximus was met by Coldroes; and having ventured a battle, his army was entirely defeated, and himself killed. But Lucius being joined by Emicius and Clarius, two other commanders sent by Trajan with fresh supplies, gained considerable advantages over the enemy, and retook the cities of Nisibis and Seleucia, which had revolted.

And now Trajan, seeing himself possessed of all the

Belk

Parthia.

best and most fruitful provinces of the Parthian empire; but at the same time being well apprised that he could not, without a vast expence, maintain his conquests, nor keep in subjection so fierce and warlike a people at such a distance from Italy; resolved to set over them a king of his own choosing, who should hold the crown of him and his successors, and acknowledge them as his lords and sovereigns. With this view he repaired to Ctesiphon; and having there assembled the chief men of the nation, he crowned one of the royal family, by name *Parthaspates*, king of Parthia, obliging all who were present to pay him their allegiance. He chose *Parthaspates*, because that prince had joined him at his first entering the Parthian dominions, conducted him with great fidelity, and shown on all occasions an extraordinary attachment to the Romans. Thus the Parthians were at last subdued, and their kingdom made tributary to Rome. But they did not long continue in this state of subjection: for they no sooner heard of Trajan's death, which happened shortly after, than, taking up arms, they drove *Parthaspates* from the throne; and, recalling *Cosdroes*, who had retired into the country of the Hyrcanians, openly revolted from Rome. *Adrian*, who was then commander in chief of all the forces in the east, and soon after acknowledged emperor by the army, did not care, though he was at that time in Syria with a very numerous army, to engage in a new war with the Parthians; but contented himself with preserving the ancient limits of the empire, without any ambitious prospects of further conquests. Therefore, in the beginning of his reign, he abandoned those provinces beyond the Euphrates which Trajan had conquered; withdrew the Roman garrisons from Mesopotamia; and, for the greater safety of other places, made the Euphrates the boundary of and barrier in those parts, posting his legions along the banks of that river.

Cosdroes died after a long reign, and was succeeded by his eldest son *Vologeses*: in whose reign the Alani breaking into Media, then subject to the Parthians, committed there great devastations; but were prevailed upon, with rich presents sent them by *Vologeses*, to abandon that kingdom, and return home. Upon their retreat, *Vologeses*, having no enemy to contend with at home, fell unexpectedly upon Armenia; surprised the legions there; and having cut them all in pieces to a man, entered Syria; defeated with great slaughter *Artabianus* Cornelianus, governor of that province; and advanced, without opposition, to the neighbourhood of Antioch; putting every where the Romans, and those who favoured them, to the sword. Hereupon the emperor *Verus*, by the advice of his colleague *Antoninus* surnamed the *Philosopher*, leaving Rome, hastened into Syria: and having driven the Parthians out of that province, ordered *Statius Priscus* to invade Armenia; and *Cassius*, with *Martius Verus*, to enter the Parthian territories, and carry the war into the enemy's country. *Priscus* made himself master of *Artaxata*; and in one campaign drove the Parthians, though not without great loss on his side, quite out of Armenia. *Cassius*, on the other hand, having, in several encounters, defeated *Vologeses*, who had an army of 400,000 men under his command, reduced, in four years time, all those provinces which

had formerly submitted to Trajan, took *Seleucia*, burnt and plundered the famous cities of Babylon and Ctesiphon, with the stately palaces of the Parthian monarchs, and struck terror into the most remote provinces of that great empire. On his return, he lost above half the number of his forces by sickness and famine; so that, after all, the Romans, as *Spartianus* observes, had no great reason to boast of their victories and conquests.

However, *Verus*, who had never stirred during the whole time of the war from Antioch and Daphne, took upon him the lofty titles of *Parthicus* and *Armenicus*, as if he had acquired them justly in the midst of his pleasures and debaucheries. After the revolt and death of *Cassius*, *Antoninus* the Philosopher repaired into Syria to settle the affairs of that province. On his arrival there, he was met by ambassadors from *Vologeses*; who having recovered most of the province subdued by *Cassius*, and being unwilling either to part with them or engage in a new war, solicited the emperor to confirm him in the possession of them, promising to hold them of him, and to acknowledge the sovereignty of Rome. To these terms *Antoninus* readily agreed, and a peace was accordingly concluded between the two empires; which *Vologeses* did not long enjoy, being soon after carried off by a distemper, and not murdered by his own subjects, as we read in *Constantinus Manasses*, who calls him *Belegeses*.

Upon his death, *Vologeses* III. the son of his brother *Sanatruces*, and grandson of *Cosdroes*, was raised to the throne. He sided with *Niger* against the emperor *Severus*: who thereupon, having settled matters at home, marched with all his forces against him; and advancing to the city of Ctesiphon, whither he had retired, laid close siege to that metropolis. *Vologeses* made a most gallant defence; but the city, after a long siege, and much bloodshed on both sides, was at length taken by assault. The king's treasures, with his wives and children, fell into the emperor's hands; but *Vologeses* himself had the good luck to make his escape; which was a great disappointment to *Severus*, who immediately dispatched an express to acquaint the senate with the success that had attended him in his expedition against the only nation that was then formidable to Rome. But he had no sooner crossed the Euphrates, than *Vologeses* recovered all the provinces, except Mesopotamia, which he had reduced. These expeditions were chargeable to the Romans, and cost them much blood, without reaping any advantages from them; for as they had not sufficient forces to keep in awe the provinces they had subdued, the inhabitants, greatly attached to the family of *Artaces*, never failed to return to their ancient obedience as soon as the Roman armies were withdrawn. *Vologeses* was soon after engaged in a war still more troublesome and destructive, with his brother *Artabanus*, who, encouraged by some of the discontented nobles, attempted to rob him of the crown, and place it on his own head. *Vologeses* gained several victories over his brother and rebellious subjects; but died before he could restore the empire to its former tranquillity.

Artabanus, who had a numerous army at his devotion, did not meet with any opposition in seizing the throne, vacant by the death of his brother, though

Parthia.

26
Parthaspates appointed king by the Roman emperor, but soon after driven out.

27
Unsuccessful wars of Vologeses with the Romans.

28
Ctesiphon taken by Severus.

Tir.

29
Infamous
treachery of
the emperor
Caracalla.

Thiridates had a better title to it, as being his elder brother. He had scarce settled the affairs of his kingdom, when the emperor Caracalla, desirous to signalize himself, as several of his predecessors had done, by some memorable exploit against the Parthians, sent a solemn embassy to him, desiring his daughter in marriage. Artabanus, overjoyed at this proposal, which he thought would be attended with a lasting peace between the two empires, received the ambassadors with all possible marks of honour, and readily complied with their request. Soon after, Caracalla sent a second embassy, to acquaint the king that he was coming to solemnise the nuptials; whereupon Artabanus went to meet him, attended with the chief of the nobility and his best troops, all unarmed, and in most pompous habits: but this peaceable train no sooner approached the Roman army, than the soldiers, on a signal given them, falling upon the king's retinue, made a most terrible slaughter of the unarmed multitude; Artabanus himself escaping with great difficulty. The treacherous Caracalla, having gained by this exploit great booty, and, as he thought, no less glory, wrote a long and boasting letter to the senate, assuming the title of *Parthicus* for this piece of treachery: as he had before that of *Germanicus*, for murdering, in like manner, some of the German nobility.

Artabanus, resolving to make the Romans pay dear for their inhuman and barbarous treachery, raised the most numerous army that had ever been known in Parthia, crossed the Euphrates, and entered Syria, putting all to fire and sword. But, Caracalla being murdered before this invasion, Macrinus, who had succeeded him, met the Parthians at the head of a mighty army, composed of many legions, and all the auxiliaries of the states of Asia. The two armies no sooner came in sight of each other, but they engaged with the utmost fury. The battle continued two days; both Romans and Parthians fighting so obstinately, that night only parted them, without any apparent advantage on either side; though both retired, when night had put an end to the contest, crying, Victory, victory. The field of battle was covered all over with dead bodies, there being already above 40,000 killed, including both Romans and Parthians: nevertheless Artabanus was heard to say, that the battle was only begun, and that he would continue it till either the Parthians or Romans were all to a man cut in pieces. But Macrinus, being well apprised that the king came highly enraged against Caracalla in particular, and dreading the consequences which would attend the destruction of his army, sent an herald to Artabanus, acquainting him with the death of Caracalla, and proposing an alliance between the two empires. The king, understanding that his great enemy was dead, readily embraced the proposals of peace and amity, upon condition that all the prisoners who had been taken by the treachery of Caracalla should be immediately restored, and a large sum of money paid him to defray the expences of the war.

These affairs being performed without delay or hesitation, Artabanus returned into Parthia, and Macrinus to Antioch.

As Artabanus lost on this occasion the flower of his army, Artaxerxes, a Persian of mean descent,

but of great courage and experience in war, revolting from the Parthians, prevailed on his countrymen to join him, and attempt the recovery of the sovereign power, which he said they had been unjustly deprived of, first by the Macedonians, and afterwards by the Parthians their vassals. Artabanus, upon the news of this revolt, marched with the whole strength of his kingdom to suppress it; but being met by Artaxerxes at the head of a no less powerful army, a bloody battle ensued, which is said to have lasted three days. At length the Parthians, though they behaved with the utmost bravery, and fought like men in despair, were forced to yield to the Persians, who were commanded by a more experienced leader. Most of their troops were cut off in the flight; and the king himself was taken prisoner, and soon after put to death by Artaxerxes's order. The Parthians, having lost in this fatal engagement both their king and their army, were forced to submit to the conqueror, and become vassals to a nation which had been subject to them for the space of 475 years.

For an account of the manners, customs, &c. of the ancient Parthians, see the article PERSIA.

PARTI, PARTIE, *Party*, or *Parted*, in heraldry, is applied to a shield or escutcheon, denoting it divided or marked out into partitions.

Parti per pale, is when the shield is divided perpendicularly into two halves, by a cut in the middle from top to bottom.

Parti per fess, is when the cut is across the middle, from side to side.

Parti per bend dexter, is when the cut comes from the upper corner of the shield on the right hand, and descends athwart to the opposite lower corner.

Parti per bend sinister, is when the cut, coming from the upper left corner, descends across to the opposite lower one.

All these partitions, according to M. de la Colombe, have their origin from the cuts and bruises that have appeared on shields after engagements; and, being proofs of the dangers to which the bearers had been exposed, they gained them esteem: for which reason they were transmitted to posterity, and became arms and marks of honour to their future families.

PARTICIPLE, in grammar, an adjective formed of a verb; so called, because it participates partly of the properties of a noun, and partly of those of a verb. See GRAMMAR.

PARTICLE, in physiology, the minute part of a body, an assemblage of which constitutes all natural bodies.

PARTICLE, in grammar, a denomination for all those small words that tie or unite others, or that express the modes or manners of words. See GRAMMAR.

PARTISAN, in the art of war, a person dextrous in commanding a party; who, knowing the country well, is employed in getting intelligence, or surprising the enemy's convoy, &c. The word also means an officer sent out upon a party, with the command of a body of light troops, generally under the appellation of the partisans corps. It is also necessary that this corps should be composed of infantry, light-horse, and hussars.

30
A desperate
battle between
the Parthians
and Romans.

PARTNERSHIP, is a contract among two or more persons, to carry on a certain business, at their joint expence, and share the gain or loss which arises from it. Of this there are four kinds.

I. Occasional joint trade, where two or more merchants agree to employ a certain sum in trade, and divide the gain or loss so soon as the adventure is brought to an issue. This kind of contract being generally private, the parties concerned are not liable for each other. If one of them purchase goods on trust, the furnisher, who grants the credit through confidence in him alone, has no recourse, in case of his insolvency, against the other partners. They are only answerable for the share of the adventure that belongs to the insolvent partner.

If it be proposed to carry the adventure further than originally agreed on, any partner may withdraw his interest; and, if it cannot be separated from the others, may insist that the whole shall be brought to an issue.

II. Standing companies, which are generally established by written contract between the parties, where the stock, the firm, duration, the division of the gain or loss, and other circumstances, are inserted.

All the partners are generally authorized to sign by the firm of the company, though this privilege may be confined to some of them by particular agreement. The firm ought only to be subscribed at the place where the copartnership is established. If a partner has occasion, when absent, to write a letter relating to their affairs, he subscribes his own name on account of the company. When the same partners carry on business at different places, they generally choose different firms for each. The signature of each partner is generally sent to new correspondents; and, when a partner is admitted, although there be no alteration in the firm, his signature is transmitted, with an intimation of the change in the copartnership, to all their correspondents. Houses that have been long established, often retain the old firm, though all the original partners be dead or withdrawn.

The powers of each partner are, in general, discretionary; but they ought not to act, in matters of importance, without consulting together, when there is an opportunity. No partner is liable to make good the loss arising from his judging wrong in a case where he had authority to act. If he exceeds his power, and the event prove unsuccessful, he must bear the loss; but, if it prove successful, the gain belongs to the company: yet, if he acquiesces in the company immediately of what he has done, they must either acquiesce therein, or leave him the chance of gain, as well as the risk of loss.

All debts contracted under the firm of the company are binding on the whole partners, though the money was borrowed by one of them for his private use, without the consent of the rest. And, if a partner exceeds his power, the others are nevertheless obliged to implement his engagements; tho' they may render him responsible for his misbehaviour.

Although the sums to be advanced by the partners be limited by the contract, if there be a necessity for raising more money to answer emergencies or pay the debts of the company, the partners must furnish what is necessary, in proportion to their shares.

A debt to a company is not cancelled by the private debts of the partner; and, when a partner becomes insolvent, the company is not bound for his debts beyond the extent of his share.

The debts of the company are preferable, on the company's effects, to the private debts of the partners.

Partnership is generally dissolved by the death of a partner: yet, when there are more partners than two, it may, by agreement, subsist among the survivors. Sometimes it is stipulated, that, in case of the death of a partner, his place shall be supplied by his son, or some other person confederated on. The contract ought to specify the time and manner in which the surviving partners shall reckon with the executors of the deceased for his share of the stock, and a reasonable time allowed for that purpose.

When partnership is dissolved, there are often outstanding debts that cannot be recovered for a long time, and effects that cannot easily be disposed on. The partnership, though dissolved in other respects, still subsists for the management of their outstanding affairs; and the money arising from them is divided among the partners, or their representatives, when it is recovered. But, as this may protract the final settlement of the company's affairs to a very inconvenient length, other methods are sometimes used to bring them to a conclusion, either in consequence of the original contract, or by agreement at the time of dissolution. Sometimes the debts and effects are sold by auction; sometimes they are divided among the partners; and, when there are two partners, one divides them into shares, as equal as possible, and the other chooses either share he thinks best.

If a partner withdraws, he continues responsible for his former partners till it be publicly known that he hath done so. A deed of separation, registered at a public office, is sufficient presumption of such notoriety.

III. Companies, where the business is conducted by officers. There are many companies of this kind in Britain, chiefly established for purposes which require a larger capital than private merchants can command. The laws with respect to these companies, when not confirmed by public authority, are the same as the former, but the articles of their agreement usually very different. The capital is confederated on; and divided into a certain number of shares, whereof each partner may hold one or more, but is generally restricted to a certain number. Any partner may transfer his share; and the company must admit his assignee as a partner. The death of the partners has no effect on the company. No partner can act personally in the affairs of the company: but the execution of their business is intrusted to officers, for whom they are responsible; and, when the partners are numerous, the superintendency of the officers is committed to directors chosen annually, or at other appointed times, by the partners.

IV. Companies incorporated by authority. A royal charter is necessary to enable a company to hold lands, to have a common seal, and enjoy the other privileges of a corporation. A charter is sometimes procured, in order to limit the risk of the partners: for, in every private company, the partners are liable for the

Partridge. the debts, without limitation : in incorporated societies, they are only liable for their shares in the stock of the society. The incorporation of societies is sometimes authorised by act of parliament ; but this high authority is not necessary, unless for conferring exclusive privileges.

PARTRIDGE, in ornithology. See **TETRAO**.

The partridge is so valuable at the table, that a great many ways of taking it have been invented by sportsmen, all of which succeed from the natural folly and timidity of the animal.

The places partridges delight in most are corn-fields, especially whilst the corn grows, for under that cover they shelter and breed : neither are those places unfrequented by them when the corn is cut down, by reason of the grain they find there, especially in wheat-stubble, the height of which they delight in, being to them as a covert or shelter. When the wheat-stubble is much trodden by men or beasts, they then betake themselves to the barley-stubble, provided it be fresh and untrodden ; and they will, in the furrows, amongst the clots, branches, and long grass, hide both themselves and coveys, which are sometimes 20 in number ; nay, 30 in a covey.

When the winter-season is arrived, and the stubble-fields are ploughed up, or over-soiled with cattle, partridges resort into the upland meadows, and lodge in the dead-grass, or fog under hedges, amongst mole-hills, or under the roots of trees ; sometimes they resort to coppices and under-woods, especially if any corn-fields are adjacent, or where there is grown broom, brakes, fern, &c.

In the harvest-time, when every field is full of men and cattle, in the day-time they are found in the fallow-fields which are next adjoining to the corn-fields, where they lie lurking till evening or morning, and then they feed among the sheaves of corn.

When their haunts are known, according to the situation of the country and season of the year, the next care must be to find them out in their haunts, which is done several ways. Some do it by the eye only ; and this art can never be taught, but learned by frequent experience, the colour of the birds being so like that of the earth at a distance, that no eye but a very conversant one could distinguish them. When they are once seen, the business is to keep the eye upon them, and then to keep in continual motion. They are a very lazy bird, and by this means will let a person almost tread upon them ; though if the person stands still to eye them, they will rise immediately, though they be at a considerable distance.

Another method of discovering them, is by going to their haunts very early in the morning, or at the close of the evening, which is called the *ducking-time*. The noise of the cock-partridge is to be attended to at this time, and is very loud and earnest. The hen will soon come up to the cock after her making the noise, which she does by way of answer ; and when they are got together, their chattering will discover them. Thus they may always be found at these times. But there is a yet better method of finding this bird, which is by the *call*. The business, in order to have success in this way, is carefully to learn the notes of the partridge, and be able to imitate all the several sounds. When perfect in this, the person is to go to

the haunts morning and evening, and placing himself in some place where he can see the birds without being seen by them, he is to listen to their calling ; and when they are heard, he is to answer in the same notes, doubling again as they do : by continuing this, they may be brought so near, that the person lying down on his back may count their whole number. Having in this manner found where the birds are, the next care is to catch them.

They are so foolish, that it is extremely easy to take them in *nets*. In order to this, there needs no more than the going out, provided with two or three nets, with meshes somewhat smaller than those of the pheasant nets, and walking round about the covey, a net is to be fixed so as to draw over them, on pulling a line at a distance. All this may be easily done ; for so long as the sportsman continues moving about, and does not fix his eye too intensely upon them, they will let him come near enough to fix the net, without moving. If they lie so fraggling, that one net will not cover them, then two or three must be fixed in the same manner. The sportsman may then draw the nets over them, and they will often lie still with the nets upon them till he comes up to fright them ; then they will rise, and be entangled in the net.

A second method of taking them is with *bird-lime*. this is done by means of wheat-straws. These must be large, and cut off between knot and knot ; they must be well lined with the best and strongest bird-lime, and the sportsman must carry a great number out with him. Having found a field where there are partridges, he is to call ; and if they answer, he is then to stick up the limed straws in rows across two or three lands, and going backward, call again to them, leading them on in the road where the straws are : they will follow one another like a flock of chickens, and come out to the call ; and will in their way run upon the straws, and liming themselves they will daub one another by crowding together, so that very few of them will be able to escape.

But there is yet a pleasanter way of taking them than this, that is, by *driving* of them. In order to this, an engine is to be made of canvas stuffed with straw, to represent a horse ; this horse and nets are to be taken to the haunts of the partridges, and the nets being placed slanting or slopewise in the lower part of the field, the sportsman is to take the wind in his back and get above them, driving them downwards ; his face is to be covered with something green or blue, and placing the horse before him, he is to go towards them slowly and gently ; and by this means they will be raised on their legs, but not on their wings, and will run before the horse into the nets. If in the way they go into a wrong path, the horse is to be moved to face them ; and they will be thus driven back again, and driven every way the sportsman pleases.

PARTURITION, the act of bringing forth, or being delivered of, young. See **MIDWIFERY**.

PARTY, in a military sense, a small number of men, horse, or foot, sent upon any kind of duty ; as into an enemy's country to pillage, to take prisoners, and to oblige the country to come under contribution. Parties are often sent out to view the roads and ways, get intelligence, seek forage ; to reconnoitre, or amuse the enemy upon a march : they are also frequently sent upon

Partridge
||
Party.

Parulides, upon the flanks of an army or regiment, to discover the enemy if near, and prevent surprise or ambuscade.

PARULIDES, in surgery, tumours and inflammations of the gums, commonly called *gum-boils*. They are to be treated with discutients like other inflammatory tumours.

PARUS, or TITMOUSE, in ornithology, a genus belonging to the order of passerles. The bill is very entire, covered at the basis with hairs; the tongue is truncated and hairy. There are 14 species; of which the most remarkable are,

1. The cristatus, or crested titmouse, weighs 13 pennyweight; the bill is black, with a spot of the same colour above it; all the upper part of the body gray; the neck and under parts are white, with a faint tincture of red, which is deepest just below the wings. The legs are of a lead colour. It erects its crown feathers into a crest. It inhabits the warm parts of North America; and frequents forest-trees, feeding upon insects.

2. The major, or great titmouse, has the head and throat black, the cheeks white, the back of a green colour, the belly yellowish green, divided in the middle by a bed of black which extends to the vent; the rump of a bluish grey, the legs of a lead colour, the toes divided to the very origin, and the back-toe very large and strong. This species sometimes visits our gardens; but for the most part inhabits woods, where it builds in hollow trees, laying about ten eggs. It feeds on insects, which it finds in the bark of trees. In the spring they do a great deal of mischief by picking off the tender buds of the fruit-trees. Like woodpeckers, they are perpetually running up and down the bodies of trees in quest of food. This bird has three cheerful notes, which it begins to utter in the month of February.

3. The ceruleus, or blue titmouse, is a very beautiful bird. The bill is short and dusky; the crown of the head of a fine blue; from the bill to the eyes is a black line; the forehead and cheeks white; the back, of a yellowish green; the lower side of the body yellow; the wings and tail blue, the former marked transversely with a white bar; the legs of a lead colour. They frequent gardens; and do great injury to fruit-trees, by bruising the tender buds in search of the insects which lie under them. It breeds in holes of walls, and lays 12 or 14 eggs.

4. The virginianus, or yellow rump, is found in Virginia; and is distinguished by a yellow spot on its rump. All the rest of the feathers are brown, with a slight tincture of green. It runs about the bodies of trees; and feeds on insects, which it pecks from the crevices of the bark.

5. The caudatus, or long-tailed titmouse, is about five inches and a quarter in length, and seven inches in breadth. The bill is black, very thick and convex, differing from all others of this genus. The top of the head, from the bill to the hind part, is white, mixed with a few dark-grey feathers: this bed of white is entirely surrounded with a broad stroke of black; which rising on each side of the upper mandible, passes over each eye, unites at the hind part of the head, and continues along the middle of the back to the rump. The feathers on each side of this black stroke are of a purplish red, as are those immediately incumbent

on the tail. The tail is the longest, in proportion to the bulk, of any British bird, being in length three inches, the form not unlike that of a magpie, consisting of 12 feathers of unequal lengths, the middlemost the longest, those on each side growing gradually shorter. These birds are often seen passing through our gardens, going from one tree to another, as if in their road to some other place, never making any halt. They make their nests with great elegance, of an oval shape, and about eight inches deep, having near the upper end a hole for admission. The external materials are mosses and lichens curiously interwoven with wool. On the inside it is very warmly lined with a thick bed of feathers. The female lays from 10 to 17 eggs. The young follow their parents the whole winter; and, from the slenderness of their bodies, and great length of tail, appear, while flying, like as many darts cutting the air.

6. The biarmicus, or bearded titmouse, has a short, strong, and very convex bill, of a box colour; the head of a fine grey; the clin and throat white; the middle of the breast flesh-coloured; the sides and thighs of a pale orange; the hind part of the neck and back of orange bay; the tail is two inches and three quarters long; the legs of a deep shining black. The female wants the flesh-colour on the breast, and a triangular tuft of black feathers on each side the bill which adorn the male. They are found in marshy places.

PASCAL (BLAISE), one of the greatest geniuses and best writers France has produced, was born at Clermont in Auvergne, in the year 1623. His father, Stephen Pascal, born in 1588, and of an ancient family, was president of the court of aids in his province: he was a very learned man, an able mathematician, and a friend of Des Cartes. Having an extraordinary tenderness for this child, his only son, he quitted his office in his province, and went and settled at Paris in 1631, that he might be quite at leisure for the instruction of him; and Blaise never had any master but his father. From his infancy he gave proofs of a very extraordinary capacity: for he desired to know the reason of every thing; and when good reasons were not given him, he would seek for better; nor would he ever yield his assent but upon such as appeared to him well grounded. There was room to fear, that with such a cast of mind he would fall into free thinking, or at least into heterodoxy; yet he was always very far from any thing of this nature.

What is told of his manner of learning the mathematics, as well as the progress he quickly made in that science, seems almost miraculous. His father, perceiving in him an extraordinary inclination to reasoning, was afraid lest the knowledge of the mathematics would hinder his learning the languages. He kept him therefore as much as he could from all notions of geometry, locked up all his books of that kind, and refrained even from speaking of it in his presence. He could not, however, make his son refrain from musing upon proportions; and one day surprised him at work with charcoal upon his chamber-floor, and in the midst of figures. He asked him what he was doing? I am searching, says Pascal, for such a thing; which was just the 32d proposition of the first book of Euclid. He asked him then how he came to think of this? It was, says Pascal, because I have found out such

another thing : and fo going backward, and ufing the names of *bar* and *round*, he came at length to the definitions and axioms he had formed to himfelf. Does it not feem miraculous, that a boy fhould work his way into the heart of a mathematical book, without ever having feen that or any other book upon the fubject, or knowing any thing of the terms? Yet we are affured of the truth of this by Madam Perier, and feveral other writers, the credit of whofe testimony cannot reasonably be queftioned. He had, from henceforward, full liberty to indulge his genius in mathematical purfuits. He underftood Euclid's Elements as foon as he caft his eyes upon them : and this was not ftrange ; for, as we have feen, he underftood them before. At 16 years of age he wrote a treatife of conic fections, which was accounted by the moft learned a mighty effort of genius ; and therefore it is no wonder that Des Cartes, who had been in Holland a long time, fhould, upon reading it, chofe to believe, that Mr Pascal, the father, was the real author of it. At nineteen, he contrived an admirable arithmetical machine, which was efteemed a very wonderful thing : and at twenty-three, having feen the Torricellian experiment, he invented and tried a great number of other new experiments.

After he had laboured abundantly in mathematical and philofophical difquisitions, he forfook thofe ftudies and all human learning at once ; and determined to know nothing, as it were, for the future, but Jefus Chrift and him crucified. He was not 24 years of age, when the reading fome pious books had put him upon taking this holy refolution ; and he became as great a devotee as any age has produced. Mr Pascal now gave himfelf up entirely to a ftate of prayer and mortification. He had always in his thoughts thefe great maxims, of renouncing all pleafure and all fuperfluity ; and this he praftifed with rigour even in his illnefses, to which he was frequently fubject, being of a very invalid habit of body : for inftance, when his ficknefs obliged him to feed fomewhat delicately, he took great care not to relifh or tafte what he eat. He had no violent affection for thofe he loved ; he thought it finful, fince a man poffeffes a heart which belongs only to God. He found fault with fome difcourfes of his fifters, which the thought very innocent ; as if he had faid upon occafion, that he had feen a beautiful woman, he would be angry, and tell her, that the might raife bad thoughts in footmen and young people. He frequently wore an iron girdle full of points next to his fkin ; and when any vain thought came into his head, or when he took particular pleafure in any thing, he gave himfelf fome blows with his elbow, to redouble the prickings, and to recall himfelf to his duty.

Though Mr Pascal had thus abftained himfelf from the world, yet he could not forbear paying fome attention to what was doing in it ; and he even interefted himfelf in the conteft between the Jefuits and the Janfenifts. The Jefuits, though they had the popes and kings on their fide, were yet decry'd by the people, who brought up afreft againft them the affaffination of Henry the Great, and all the old ftories that were likely to make them odious. Pascal went farther ; and by his *Lettres Provinciales*, published in 1656, under the name of *Louis de Montalte*, made them

the fubject of ridicule. " Thefe letters," fays Voltaire, " may be confidered as a model of eloquence and humour. The beft comedies of Moliere have not more wit than the firft part of thefe letters ; and the fublimity of the latter part of them is equal to any thing in Boffuet. It is true, indeed, that the whole book was built upon a falfe foundation ; for the extravagant notions of a few Spanifh and Flemifh Jefuits were artfully afcribed to the whole fociety. Many abfurdities might likewise have been difcovered among the Dominican and Francifcan cafuifts : but this would not have answered the purpofe ; for the whole rallery was to be levelled only at the Jefuits. Thefe letters were intended to prove, that the Jefuits had formed a defign to corrupt mankind ; a defign which no feft or fociety ever had, or can have " Voltaire calls Pascal the firft of their fatyrids ; for Despreaux, fays he, muft be confidered as only the fecond. In another place, fpeaking of this work of Pascal, he fays, that " examples of all the various fpecies of eloquence are to be found in it. Though it has been now written almoft 100 years, yet not a fingle word occurs in it, favouring of that viciuftude to which living languages are fo fubject. Here then we are to fix the epocha when our language may be faid to have affumed a fettled form. The bifhop of Lucon, fon of the celebrated Buffy, told me, that afking one day the bifhop of Meaux what work he would covet moft to be the author of, fuppofing his own performances fet afide, Boffuet replied, The Provincial Letters." Thefe letters have been tranflated into all languages, and printed over and over again. Some have faid, that there were decrees of formal condemnation againft them ; and alfo that Pascal himfelf, in his laft illnefs, detefted them, and repented of having been a Janfenift : but both thefe particulars are falfe and without foundation. Father Daniel was fuppofed to be the anonymous author of a piece againft them, intitled, *The Dialogues of Cleander and Eudoxus*.

Mr Pascal died at Paris the 19th of Auguft 1662, aged 39 years. He had been fome time about a work againft atheifts and infidels, but did not live long enough to digeft the materials he had collected. What was found among his papers was publifhed under the title of *Penfees*, &c. or *Thoughts upon religion and other fubjects*, and has been much admired. After his death appeared alfo two other little trafts ; one of which is intitled, *The equilibrium of fluids* ; and the other, *The weight of the mafs of air*.

To conclude, Mr Pascal was, all things confidered, a man of a moft fingular compofition ; or, as Mr Bayle fays, " a paradoxical individuum of the human kind."

PASCHAL, fomething belonging to the paffover, or Eaftter. See PASSOVER and EASTER.

PASIPHAE, in fabulous hiftory, the daughter of Apollo, and the wife of Minos, king of Crete, by whom he had Androgeos, Ariadne, and Phaedra. She conceived a violent paffion for a bull ; and had by him the Minotaur, which was kept in the labyrinth, where it was killed by Thefeus.

PASQUIN, a mutilated ftatue at Rome, in a corner of the palace of the Urfini. It takes its name from a cobbler of that city called *Pasquin*, famous for his fcofers and gibes, and who diverted himfelf by paffing his jokes on all that went through that ftreet.

After

Pasquinade After his death, as they were digging up the pavement before his door, they found in the earth the statue of an ancient gladiator, well cut, but maimed and half-spoiled: this they set up in the place where it was found, and by common consent named it *Pasquin*. Since that time all satires are attributed to that figure; and are either put into its mouth, or paited upon it, as if they were written by *Pasquin* redivivus; and these are addressed by *Pasquin* to *Marforio*, another statue at Rome. When *Marforio* is attacked, *Pasquin* comes to his assistance; and, when *Pasquin* is attacked, *Marforio* assists him in his turn: that is, the people make the statues speak just what they please.

PASQUINADE, a satirical libel fastened to the statue of *Pasquin*: these are commonly short, witty, and pointed; and from hence the term has been applied to all lampoons of the same cast.

PASS, or **PASSADE**, in fencing; an advance, or leap forward upon the enemy. Of these there are several kinds; as passes within, above, beneath, to the right, the left, and passes under the line, &c. The measure of the pass is when the swords are so near as that they may touch one another.

Pass, in a military sense, a strait and difficult passage, which shuts up the entrance into a country.

Pass-Parole, in military affairs, a command given at the head of an army, and thence communicated to the rear, by passing it from mouth to mouth.

PASSADE, in the manege, is a turn or course of a horse backwards or forwards on the same spot of ground. Hence there are several sorts of passades, according to the different ways of turning, in order to part or return upon the same tread, which is called *closing the passade*; as the passade of one time, the passade of five times, and the raised or high passades, into which the demolvets are made into curvets. See HORSEMANSHIP.

North-west PASSAGE. } See **POLE**.

North-east PASSAGE. }

Right of PASSAGE, in commerce, is an imposition or duty exacted by some princes, either by land or sea, in certain close and narrow places in their territories, on all vessels and carriages, and even sometimes on persons or passengers coming in or going out of ports, &c. The most celebrated passage of this kind in Europe is the Sound; the dues for passing which strait belong to the king of Denmark, and are paid at Elsenore or Cronenburg.

PASSANT, in herald, a term applied to a lion or other animal in a shield, appearing to walk leisurely: for most beasts, except lions, the *trippant* is frequently used instead of *passant*.

PASSAU, an ancient, handsome, and celebrated town of Germany, in lower Bavaria, with a bishop's see and fort. The houses are well built, and the cathedral is thought to be the finest in all Germany. It is divided into four parts, three of which are fortified; but the other is only a suburb, and has nothing but an old castle in which the bishop generally resides. It is situated at the confluence of the rivers Inn and Ilz, in E. Long. 13. 34. N. Lat. 48. 26.

PASSAU, a bishopric of Germany, lying between Lower Bavaria, Austria, and Bohemia. It extends

not above 20 miles where largest; and has no considerable place, except the capital which is of the same name.

Passerat
Passions.

PASSERAT (John), a celebrated professor of eloquence in the royal college of Paris, and one of the politest writers of his time, was born at Troyes in the province of Champagne, in 1534. He spent three years in studying the law under the famous Cujacius at Bourges, where he became professor of eloquence in 1572. He was an indefatigable student, passing frequently whole days without eating a morsel; yet to an extraordinary erudition he joined an uncommon politeness of manners and pleasantry, having nothing of the mere scholar except the gown and hood. He gained the esteem of the kings Charles IX. Henry III. and of all the men of wit and learning in his time. He died in 1602, and left several admired works behind him.

PASSERES, the name of a class of birds. See ZOOLOGY.

PASSIONS, in moral philosophy, are certain motions of the soul, which make it pursue what appears to be good, and avoid whatever threatens evil. See METAPHYSICS, n° 31, 32.

On the just regulation and subordination of the passions depends in a great measure the happiness of mankind. See *MORAL Philosophy*, n° 6, 17, 31, 32, 68, 212.

PASSIONS and Emotions, difference between them. See **EMOTIONS and Passions**.

External Signs of Emotions and PASSIONS. So intimately connected are the soul and body, that every agitation in the former produces a visible effect upon the latter. There is, at the same time, a wonderful uniformity in that operation; each class of emotions and passions being invariably attended with an external appearance peculiar to itself. These external appearances, or signs, may not improperly be considered as a natural language, expressing to all beholders emotions and passions as they arise in the heart. Hope, fear, joy, grief, are displayed externally: the character of a man can be read in his face; and beauty, which makes so deep an impression, is known to result, not so much from regular features and a fine complexion, as from good-nature, goodness, sprightliness, sweetness, or other mental quality, expressed upon the countenance. Though perfect skill in that language be rare, yet what is generally known is sufficient for the ordinary purposes of life. But by what means we come to understand the language, is a point of some intricacy. It cannot be by sight merely; for upon the most attentive inspection of the human visage, all that can be discerned are figure, colour, and motion, which, singly or combined, never can represent a passion, nor a sentiment: the external sign is indeed visible; but to understand its meaning, we must be able to connect it with the passion that causes it, an operation far beyond the reach of eye-sight. Where then is the instructor to be found that can unveil this secret connection? If we apply to experience, it is yielded, that from long and diligent observation, we may gather, in some measure, in what manner those we are acquainted with express their passions externally: but with respect to strangers, we are left in the dark; and yet we are not puzzled

puzzled about the meaning of these external expressions in a stranger, more than in a bosom-companion. Further, had we no other means but experience for understanding the external signs of passion, we could not expect any uniformity nor any degree of skill in the bulk of individuals: yet matters are so much better ordered, that the external expressions of passion form a language understood by all, by the young as well as the old, by the ignorant as well as the learned: We talk of the plain and legible characters of that language; for undoubtedly we are much indebted to experience, in deciphering the dark and more delicate expressions. Where then shall we apply for a solution of this intricate problem, which seems to penetrate deep into human nature? Undoubtedly if the meaning of external signs be not derived to us from sight, nor from experience, there is no remaining source whence it can be derived but from nature.

Elements of Criticism.

We may then venture to pronounce, with some degree of confidence, that man is provided by nature with a sense or faculty that lays open to him every passion by means of its external expressions. And we cannot entertain any reasonable doubt of this, when we reflect, that the meaning of external signs is not hid even from infants: an infant is remarkably affected with the passions of its nurse expressed on her countenance; a smile cheers it, a frown makes it afraid: but fear cannot be without apprehending danger; and what danger can the infant apprehend, unless it be sensible that its nurse is angry? We must therefore admit, that a child can read anger in its nurse's face; of which it must be sensible intuitively, for it has no other mean of knowledge. We do not affirm, that these particulars are clearly apprehended by the child; for to produce clear and distinct perceptions, reflection and experience are requisite: but that even an infant, when afraid, must have some notion of its being in danger, is evident.

That we should be conscious intuitively of a passion from its external expressions, is conformable to the analogy of nature: the knowledge of that language is of too great importance to be left upon experience; because a foundation so uncertain and precarious, would prove a great obstacle to the formation of societies. Wisely therefore is it ordered, and agreeably to the system of Providence, that we should have nature for our instructor.

Manifold and admirable are the purposes to which the external signs of passion are made subservient by the Author of our nature.

1. The signs of internal agitation displayed externally to every spectator, tend to fix the signification of many words. The only effectual means to ascertain the meaning of any doubtful word, is an appeal to the thing it represents: and hence the ambiguity of words expressive of things that are not objects of external sense; for in that case an appeal is denied. Passion, strictly speaking, is not an object of external sense: but its external signs are; and by means of these signs, passions may be appealed to with tolerable accuracy: thus the words that denote our passions, next to those that denote external objects, have the most distinct meaning. Words signifying internal action and the more delicate feelings, are less distinct. This defect with regard to internal action, is what chiefly occa-

sions the intricacy of logic: the terms of that science are far from being sufficiently ascertained, even after much care and labour bestowed by an eminent writer;* to whom however the world is greatly indebted, for removing a mountain of rubbish, and moulding the subject into a rational and correct form. The same defect is remarkable in criticism, which has for its object the more delicate feelings; the terms that denote these feelings being not more distinct than those of logic.

Locke.

2. Society among individuals is greatly promoted by that universal language. Looks and gestures give direct access to the heart; and lead us to select, with tolerable accuracy, the persons who are worthy of our confidence. It is surprising how quickly, and for the most part how correctly, we judge of character from external appearance.

3. After social intercourse is commenced, these external signs, which diffuse through a whole assembly the feelings of each individual, contribute above all other means to improve the social affections. Language, no doubt, is the most comprehensive vehicle for communicating emotions: but in expedition, as well as in power of conviction, it falls short of the signs under consideration; the involuntary signs especially, which are incapable of deceit. Where the countenance, the tones, the gestures, the actions, join with the words in communicating emotions, these united have a force irresistible: thus all the pleasant emotions of the human heart, with all the social and virtuous affections, are, by means of these external signs, not only perceived, but felt. By this admirable contrivance, conversation becomes that lively and animating amusement, without which life would at best be insipid: one joyful countenance spreads cheerfulness instantaneously through a multitude of spectators.

4. Disocial passions, being hurtful by prompting violence and mischief, are noted by the most conspicuous external signs, in order to put us upon our guard: thus anger and revenge, especially when sudden, display themselves on the countenance in legible character. The external signs, again, of every passion that threatens danger, raise in us the passion of fear: which frequently operating without reason or reflection, moves us by a sudden impulse to avoid the impending danger.

5. These external signs are remarkably subservient to morality. A painful passion, being accompanied with disagreeable external signs, must produce in every spectator a painful emotion: but then, if the passion be social, the emotion it produces is attractive, and connects the spectator with the person who suffers. Disocial passions only, are productive of repulsive emotions, involving the spectator's aversion, and frequently his indignation. This artful contrivance makes us cling to the virtuous, and abhor the wicked.

6. Of all the external signs of passion, those of affliction or distress are the most illustrious with respect to a final cause, and deservedly merit a place of distinction. They are illustrious by the singularity of their contrivance; and also by inspiring sympathy, a passion to which human society is indebted for its greatest blessing, that of providing relief for the distressed. A subject so interesting, deserves a leisurely and attentive examination. The conformity of the nature

ture

ture of man to his external circumstances, is in every particular wonderful: his nature makes him prone to society; and society is necessary to his well-being, because in a solitary state he is a helpless being, destitute of support, and in his distresses destitute of relief: but mental support, the shining attribute of society, is of too great moment to be left dependent upon cool reason; it is ordered more wisely, and with greater conformity to the analogy of nature, that it should be enforced even instinctively by the passion of sympathy. Here sympathy makes a capital figure; and contributes, more than any other means, to make life easy and comfortable. But however essential the sympathy of others may be to our well-being, one beforehand would not readily conceive how it could be raised by external signs of distress: for considering the analogy of nature, if these signs be agreeable, they must give birth to a pleasant emotion leading every beholder to be pleased with human woes: if disagreeable, as they undoubtedly are, ought they not naturally to repel the spectator from them, in order to be relieved from pain? Such would be the reasoning beforehand; and such would be the effect were man purely a selfish being. But the benevolence of our nature gives a very different direction to the painful passion of sympathy, and to the desire involved in it: instead of avoiding distress, we fly to it in order to afford relief; and our sympathy cannot be otherwise gratified but by giving all the succour in our power. Thus external signs of distress, though disagreeable, are attractive: and the sympathy they inspire is a powerful cause, impelling us to afford relief even to a stranger, as if he were our friend or relation.

It is a noted observation, that the deepest tragedies are the most crowded: which in an overly view will be thought an unaccountable bias in human nature. Love of novelty, desire of occupation, beauty of action, make us fond of theatrical representations; and when once engaged, we must follow the story to the conclusion, whatever distress it may create. But we generally become wise by experience; and when we foresee what pain we shall suffer during the course of the representation, is it not surprising that persons of reflection do not avoid such spectacles altogether? And yet one who has scarce recovered from the distress of a deep tragedy, resolves coolly and deliberately to go to the very next, without the slightest obstruction from self-love. The whole mystery is explained by a single observation: That sympathy, though painful, is attractive; and attaches us to an object in distress, instead of prompting us to fly from it. And by this curious mechanism it is, that persons of any degree of sensibility are attracted by affliction still more than by joy.

To conclude: the external signs of passion are a strong indication, that man, by his very constitution, is framed to be open and sincere. A child, in all things obedient to the impulses of nature, hides none of its emotions; the savage and clown, who have no guide but pure nature, expose their hearts to view, by giving way to all the natural signs. And even when men learn to dissemble their sentiments, and when behaviour degenerates into art, there still remain checks, that keep dissimulation within bounds, and prevent a great part of its mischievous effects: the total suppression of the

voluntary signs during any vivid passion, begets the utmost uneasiness, which cannot be endured for any considerable time: this operation becomes indeed less painful by habit; but luckily the involuntary signs cannot, by any effort, be suppressed nor even dissembled. An absolute hypocrisy, by which the character is concealed and a fictitious one assumed, is made impracticable; and nature has thereby prevented much harm to society. We may pronounce, therefore, that Nature, herself sincere and candid, intends that mankind should preserve the same character, by cultivating simplicity and truth, and banishing every sort of dissimulation that tends to mischief.

Influence of PASSION with respect to our Perceptions, Opinions, and Belief. So intimately are our perceptions, passions, and actions, connected, it would be wonderful if they should have no mutual influence. That our actions are too much influenced by passion, is a known truth; but it is not less certain, though not so well known, that passion hath also an influence upon our perceptions, opinions, and belief. For example, the opinions we form of men and things are generally directed by affection: An advice given by a man of figure hath great weight; the same advice from one in a low condition is despised or neglected: a man of courage under-rates danger; and to the indolent the slightest obstacle appears unsurmountable.

There is no truth more universally known, than that tranquillity and sedateness are the proper state of mind for accurate perception and cool deliberation; and for that reason, we never regard the opinion even of the wisest man, when we discover prejudice or passion behind the curtain. Passion hath such influence over us, as to give a false light to all its objects. Agreeable passions prepossess the mind in favour of their objects; and disagreeable passions, not less against their objects: A woman is all perfection in her lover's opinion, while in the eye of a rival beauty she is awkward and disagreeable: when the passion of love is gone, beauty vanishes with it;—nothing left of that gentle motion, that sprightly conversation, those numberless graces, which formerly, in the lover's opinion, charmed all hearts. To a zealot every one of his own sect is a saint, while the most upright of a different sect are to him children of perdition: the talent of speaking in a friend, is more regarded than prudent conduct in any other. Nor will this surmise any one acquainted with the world; our opinions, the result frequently of various and complicated views, are commonly so slight and wavering, as readily to be susceptible of a bias from passion.

With that natural bias another circumstance concurs, to give passion an undue influence on our opinions and belief; and that is a strong tendency in our nature to justify our passions as well as our actions, not to others only, but even to ourselves. That tendency is peculiarly remarkable with respect to disagreeable passions: by its influence, objects are magnified or lessened, circumstances supplied or suppressed, every thing coloured and disguised, to answer the end of justification. Hence the foundation of self-deceit, where a man imposes upon himself innocently, and even without suspicion of a bias.

We proceed to illustrate the foregoing observations by proper examples.

Gratitude,

Elements of Criticism,
vol. i. p. 152
&c.

Gratitude, when warm, is often exerted upon the children of the benefactor; especially where he is removed out of reach by death or absence. The passion in this case being exerted for the sake of the benefactor, requires no peculiar excellence in his children: but the practice of doing good to these children produces affection for them, which never fails to advance them in our esteem. By such means, strong connections of affection are often formed among individuals, upon the slight foundation now mentioned.

Envy is a passion, which, being altogether unjustifiable, cannot be excused but by disguising it under some plausible name. At the same time, no passion is more eager than envy, to give its object a disagreeable appearance: it magnifies every bad quality, and fixes on the most humbling circumstances:

Cassius. I cannot tell what you and other men Think of this life; but for my single self, I had as lief not be, as live to be In awe of such a thing as I myself. I was born free as Cæsar, so were you; We both have fed as well; and we can both Endure the winter's cold as well as he. For once, upon a raw and gusty day, The troubled Tyber chasing with his shores, Cæsar says to me, 'Dar't thou, Cassius, now Leap in with me into this angry flood, And swim to yonder point?'—Upon the word, Accounted as I was, I plunged in, And bid him follow; so indeed he did. The torrent roar'd, and we did buffet it With lusty sinews; throwing it aside, And stemming it with hearts of controversy. But ere we could arrive the point propos'd, Cæsar cry'd, 'Help me, Cassius, or I sink.' I, as *Æneas*, our great ancestor, Did from the flames of Troy upon his shoulder The old Anchises bear; so from the waves of Tyber Did I the tired Cæsar; and this man Is now become a god; and Cassius is A wretched creature, and must bend his body If Cæsar carelessly but nod on him. He had a fever when he was in Spain; And when the fit was on him, I did mark How he did shake. 'Tis true, this god did shake; His coward lips did from their colour fly; And that same eye whose bend doth awe the world, Did lose its lustre; I did hear him groan; Ay, and that tongue of his, that bade the Romans Mark him, and write his speeches in their books, Alas! it cry'd—Give me some drink, Titinius,—As a sick girl. Ye gods, it doth amaze me, A man of such a feeble temper should So get the start of the majestic world, And bear the palm alone. *Julius Cæsar, act 1. sc. 3.*

Clo'ter, inflamed with repentment against his son Edgar, could even force himself into a momentary conviction that they were not related:

O strange fasten'd villain!
Would he deny his letter?—I never got him.

King Lear, act 2. sc. 3.

When by great sensibility of heart, or other means, grief becomes immoderate, the mind, in order to justify itself, is prone to magnify the cause; and if the

real cause admit not of being magnified, the mind seeks a cause for its grief in imagined future events:

Buffy. Madam, your Majesty is much too sad:
You promis'd, when you parted with the king,
To lay aside self-harming heaviness,
And entertain a cheerful disposition.

Queen. To please the king, I did; to please myself, I cannot do it. Yet I know no cause
Why I should welcome such a guest as grief;
Save bidding farewell to so sweet a guest
As my sweet Richard: yet again, methinks,
Some unborn sorrow, ripe in Fortune's womb,
Is coming tow'rd me: and my inward soul
With something trembles, yet at nothing grieves,
More than with parting from my lord the king.

Richard II. act 2. sc. 5.

Repentment at first is vented on the relations of the offender, in order to punish him: but as repentment, when so outrageous, is contrary to conscience, the mind, to justify its passion, is disposed to paint these relations in the blackest colours; and it comes at last to be convinced, that they ought to be punished for their own demerits.

Anger raised by an accidental stroke upon a tender part of the body, is sometimes vented upon the undesigning cause. But as the passion in that case is absurd, and as there can be no solid gratification in punishing the innocent, the mind, prone to justify as well as to gratify its passion, deludes itself into a conviction of the action's being voluntary. The conviction, however, is but momentary; the first reflection shows it to be erroneous: and the passion vanisheth almost instantaneously with the conviction. But anger, the most violent of all passions, has still greater influence: it sometimes forces the mind to personify a flock or a stone if it happen to occasion bodily pain, and even to believe it a voluntary agent, in order to be a proper object of repentment. And that we have really a momentary conviction of its being a voluntary agent, must be evident from considering, that without such conviction the passion can neither be justified nor gratified: the imagination can give no aid; for a flock or a stone imagined sensible, cannot be an object of punishment, if the mind be conscious that it is an imagination merely without any reality. Of such personification, involving a conviction of reality, there is one illustrious instance. When the first bridge of boats over the Hellespont was destroyed by a storm, Xerxes fell into a transport of rage, so excessive, that he commanded the sea to be punished with 300 stripes; and a pair of fetters to be thrown into it, enjoining the following words to be pronounced: "O thou salt and bitter water! thy master hath condemned thee to this Herodot. punishment for offending him without cause; and is lib. 7. resolved to pass over thee in despite of thy insolence: with reason all men neglect to sacrifice to thee, because thou art both disagreeable and treacherous."

Shakespeare exhibits beautiful examples of the irregular influence of passion in making us believe things to be otherwise than they are. King Lear, in his distress, personifies the rain, wind, and thunder; and in order to justify his repentment, believes them to be taking part with his daughters:

Lear. Rumble thy bellyfull, spit fire, spout rain!

Non

Nor rain, wind, thunder, fire, are my daughters.
 I tax not you, ye elements, with unkindness;
 I never gave you kingdoms, call'd you children;
 You owe me no subscription. Then let fall
 Your horrible pleasure.—Here I stand, your brave;
 A poor, infirm, weak, and despis'd old man!
 But yet I call you fervile ministers,
 That have with two pernicious daughters join'd
 Your high-engender'd battles, 'gainst a head
 So old and white as this. Oh! oh! 'tis foul!

Act 3. sc. 2.

King Richard, full of indignation against his favourite horse for carrying Bolingbroke, is led into the conviction of his being rational:

Groom. O, how it yearn'd my heart, when I beheld
 In London streets, that coronation-day,
 When Bolingbroke rode on Roan Barbary,
 That horse that thou so often hast bestrid,
 That horse that I so carefully have dress'd.

K. Rich. Rod he on Barbary? tell me, gentle friend,
 How went he under him?

Groom. So proudly as he had disdain'd the ground.
K. Rich. So proud that Bolingbroke was on his back!
 That jade had eat bread from my royal hand.
 This hand hath made him proud with clapping him.
 Would he not stumble? would he not fall down,
 (Since pride must have a fall), and break the neck
 Of that proud man that did usurp his back?

Richard II. act 5. sc. 11.

Hamlet, swelled with indignation at his mother's second marriage, was strongly inclined to lessen the time of her widowhood, the shortness of the time being a violent circumstance against her; and he deludes himself by degrees into the opinion of an interval shorter than the real one:

Hamlet. ————— That it should come to this!
 But two months dead! nay, not so much; not two—
 So excellent a king, that was, to this,
 Hyperion to a satyr: so loving to my mother,
 That he permitted not the wind of heav'n
 Visit her face too roughly. Heav'n and earth!
 Must I remember—why, she would hang on him,
 As if increase of appetite had grown
 By what it fed on: yet, within a month—
 Let me not think—Faintly, thy name is *Woman!*
 A little month! or ere those shoes were old,
 With which she follow'd my poor father's body,
 Like Niobe, all tears—why she, ev'n she—
 (O heav'n!) a beast, that wants discourse of reason,
 Would have mourn'd longer! married with mine uncle,
 My father's brother; but no more like my father,
 Than I to Hercules. Within a month!—
 Ere yet the salt of most unrighteous tears
 Had left the flushing in her gauled eyes,
 She married—Oh, most wicked speed! to post
 With such dexterity to incestuous sheets!
 It is not, nor it cannot come to good.
 But break, my heart, for I must hold my tongue.

Act 1. sc. 3.

The power of passion to falsify the computation of time is remarkable in this instance; because time, which hath an accurate measure, is less obsequious to our desires and wishes, than objects which have no precise

standard of less or more.

Good news are greedily swallowed upon very slender evidence; our wishes magnify the probability of the event, as well as the veracity of the relater; and we believe as certain, what at best is doubtful:

Quel, che l'huom vede, amor li fa invisibile
 E l'invissibil fa veder amore.
 Quello creduto fu, che l'maier suole
 Dar facile credenza a' quel, che vuole.

Orland. Furios. cant. 1. st. 56.

For the same reason, bad news gain also credit upon the slightest evidence: fear, if once alarmed, has the same effect with hope, to magnify every circumstance that tends to conviction. Shakespeare, who shows more knowledge of human nature than any of our philosophers, hath in his Cymbeline represented this bias of the mind; for he makes the person who alone was affected with the bad news, yield to evidence that did not convince any of his companions. And Othello is convinced of his wife's infidelity from circumstances too slight to move any person less interested.

If the news interest us in so low a degree as to give place to reason, the effect will not be altogether the same: judging of the probability or improbability of the story, the mind settles in a rational conviction either that it is true or not. But even in that case, the mind is not allowed to rest in that degree of conviction which is produced by rational evidence: if the news be in any degree favourable, our belief is raised by hope to an improper height; and if unfavourable, by fear.

This observation holds equally with respect to future events: if a future event be either much wished or dreaded, the mind never fails to augment the probability beyond truth.

That easiness of belief with respect to wonders and prodigies, even the most absurd and ridiculous, is a strange phenomenon; because nothing can be more evident than the following proposition, That the more singular any event is, the more evidence is required to produce belief: a familiar event daily occurring, being in itself extremely probable, finds ready credit, and therefore is vouched by the slightest evidence; but to overcome the improbability of a strange and rare event, contrary to the course of nature, the very strongest evidence is required. It is certain, however, that wonders and prodigies are swallowed by the vulgar, upon evidence that would not be sufficient to ascertain the most familiar occurrence. It has been reckoned difficult to explain that irregular bias of mind; but we are now made acquainted with the influence of passion upon opinion and belief: a story of ghosts or fairies, told with an air of gravity and truth, raiseth an emotion of wonder, and perhaps of dread; and these emotions imposing on a weak mind, impress upon it a thorough conviction contrary to reason.

Opinion and belief are influenced by propensity as well as by passion. An innate propensity is all we have to convince us that the operations of nature are uniform: influenced by that propensity, we often rashly think, that good or bad weather will never have an end; and in natural philosophy, writers, influenced by the same propensity, stretch commonly their analogical reasonings beyond just bounds.

Opinion:

Opinion and belief are influenced by affection as well as by propensity. The noted story of a fine lady and a curate viewing the moon through a telescope, is a pleasant illustration: "I perceive," says the lady, "two shadows inclining to each other; they are certainly two happy lovers." "Not at all," replies the curate, "they are two steeples of a cathedral."

Language of PASSION. Among the particulars that compose the social part of our nature, a propensity to communicate our opinions, our emotions, and every thing that affects us, is remarkable. Bad fortune and injustice affect us greatly; and of these we are so prone to complain, that if we have no friend nor acquaintance to take part in our sufferings, we sometimes utter our complaints aloud, even where there are none to listen.

But this propensity operates not in every state of mind. A man immoderately grieved, seeks to afflict himself, rejecting all consolation: immoderate grief accordingly is mute; complaining is struggling for consolation.

It is the wretch's comfort still to have
Some small reserve of near and inward woe,
Some unsuspected hoard of inward grief,
Which they unseen may wail, and weep, and mourn,
And glutton-like alone devour.

Mourning Bride, act 1. sc. 1.

When grief subsides, it then, and no sooner, finds a tongue: we complain, because complaining is an effort to disburden the mind of its distress. This observation is finely illustrated by a story which Herodotus records, *b. 3.* Cambyfes, when he conquered Egypt, made Plammenitus the king prisoner; and for trying his constancy, ordered his daughter to be dressed in the habit of a slave, and to be employ'd in bringing water from the river; his son also was led to execution with a halter about his neck. The Egyptians vented their sorrow in tears and lamentations: Plammenitus only, with a downcast eye, remained silent. Afterward meeting one of his companions, a man advanced in years, who, being plundered of all, was begging alms, he wept bitterly, calling him by his name. Cambyfes, struck with wonder, demanded an answer to the following question: "Plammenitus, thy master Cambyfes is desirous to know, why, after thou hadst seen thy daughter so ignominiously treated, and thy son led to execution, without exclaiming or weeping, thou shouldst be so highly concerned for a poor man, no way related to thee?" Plammenitus returned the following answer: "Son of Cyrus, the calamities of my family are too great to leave me the power of weeping; but the misfortunes of a companion, reduced in his old age to want of bread, is a fit subject for lamentation."

Surprise and terror are silent passions, for a different reason: they agitate the mind so violently, as for a time to suspend the exercise of its faculties, and among others the faculty of speech.

Love and revenge, when immoderate, are not more loquacious than immoderate grief. But when these passions become moderate, they set the tongue free, and, like moderate grief, become loquacious. Moderate love, when unsuccessful, is vented in complaints; when successful, is full of joy expressed by words and gestures.

As no passion hath any long uninterrupted existence, nor beats always with an equal pulse, the language suggested by passion is not only unequal but frequently interrupted: and even during an uninterrupted fit of passion, we only express in words the more capital sentiments. In familiar conversation, one who vents every single thought, is justly branded with the character of *loquacity*; because sensible people express no thoughts but what make some figure: in the same manner, we are only disposed to express the strongest impulses of passion, especially when it returns with impetuosity after interruption.

It is elsewhere observed *, that the sentiments ought to be tuned to the passion, and the language to both. Elevated sentiments require elevated language: tender sentiments ought to be clothed in words that are soft and flowing: when the mind is depressed with any passion, the sentiments must be expressed in words that are humble, not low. Words being intimately connected with the ideas they represent, the greatest harmony is required between them: to express, for example, an humble sentiment in high-sounding words, is disagreeable by a discordant mixture of feelings; and the discord is not less when elevated sentiments are dressed in low words:

Verbis exponi tragicis res comica non vult.
Indignatur item privatis ac prope focco
Dignis carminibus narrari cœna Thyestæ.

Horat. Ars poet. l. 89.

This, however, excludes not figurative expression, which, within moderate bounds, communicates to the sentiment an agreeable elevation. We are sensible of an effect directly opposite, where figurative expression is indulged beyond a just measure: the opposition between the expression and the sentiment makes the discord appear greater than it is in reality.

At the same time, figures are not equally the language of every passion: pleasant emotions, which elevate or swell the mind, vent themselves in strong epithets and figurative expression; but humbling and dispiriting passions affect to speak plain:

Et tragicus plerumque dolet sermone pedestri
Telephus et Peleus: cum pauper et exul uterque;
Projicit ampullas et sequepedalia verba,
Si curat cor spectantis tettegisse querela.

Horat. Ars poet. 95.

Figurative expression, being the work of an enlivened imagination, cannot be the language of anguish or distress. Otway, sensible of this, has painted a scene of distress in colours finely adapted to the subject: there is scarce a figure in it, except a short and natural simile with which the speech is introduced. Belvidera talking to her father of her husband:

Think you saw what part at our last parting;
Think you beheld him like a raging lion,
Pacing the earth, and tearing up his steps,
Fate in his eyes, and roaring with the pain
Of burning fury; think you saw his one hand
Fix'd on my throat, while the extended other
Grasp'd a keen threatening dagger: oh, 'twas thus
We last embrac'd, when, trembling with revenge,
He dragg'd me to the ground, and at my bosom
Presented horrid death; cry'd out, My friends!

Where

* See the article *Sentiments*.

Where are my friends I swore, wept, rag'd, threaten'd,
For he yet lov'd, and that dear love prefer'd me [lov'd;
To this last trial of a father's pity.
I fear not death, but cannot bear a thought
That that dear hand should do th' unfriendly office.
If I was ever then your care, now hear me;
Fly to the senate, save the promis'd lives
Of his dear friends, ere mine be made the sacrifice.

Venice prefer'd, act 5.

To preserve the foreaid resemblance between words
and their meaning, the sentiments of active and hurrying
passions ought to be dress'd in words where syl-
lables prevail that are pronounced short or fast; for
these make an impression of hurry and precipitation.
Emotions, on the other hand, that rest upon their
objects, are best express'd by words where syllables
prevail that are pronounced long or slow. A person
affected with melancholy, has a languid and slow train
of perceptions. The expression best suited to that state
of mind, is where words, not only of long, but of
many syllables, abound in the composition; and for
that reason, nothing can be finer than the following
passage:

In those deep solitudes, and awful cells,
Where heav'nly-pensive Contemplation dwells,
And ever-musing Melancholy reigns.

POPE, Eloisa to Abelard.

To preserve the same resemblance, another circum-
stance is requisite, that the language, like the emo-
tion, be rough or smooth, broken or uniform. Calm
and sweet emotions are best express'd by words that
glide softly: surprise, fear, and other turbulent pas-
sions, require an expression both rough and broken.

It cannot have escap'd any diligent inquirer into na-
ture, that in the hurry of passion, one generally ex-
presses that thing first which is most at heart; which is
beautifully done in the following passage.

Me, me; adsum qui feci: in me convertite ferrum,
O Rutuli, mea fraus omnis.

Æneid. ix. 427.

Passion has often the effect of redoubling words,
the better to make them express the strong conception
of the mind. This is finely imitated in the following
examples.

Thou sun, said I, fair light!
And thou enlighten'd earth, so fresh and gay!
Ye hills and dales, ye rivers, woods, and plains!
And ye that live, and move, fair creatures! tell,
Tell, if ye saw, how came I thus, how here.—

Paradise Lost, b. viii. 273.

Both have sinn'd! but thou
Against God only; I, 'gainst God and thee:
And to the place of judgment will return;
'Twere with my cries importune Heaven, that all
The sentence, from thy head remov'd, may light
On me, sole cause to thee of all this woe;
Me! nie! only just object of his ire.

Paradise Lost, b. x. 930.

1. In general, the language of violent passion ought
to be broken and interrupted. Soliloquies ought to be
fo in a peculiar manner: language is intended by na-
ture for society; and a man when alone, though he
always clothes his thoughts in words, seldom gives his

words utterance, unless when prompted by some strong
emotion; and even then by starts and intervals only.
Shakespeare's soliloquies may be justly establish'd as
a model; for it is not easy to conceive any model more
perfect. Of his many incomparable soliloquies, the two
following only shall be quoted, being different in their
manner.

Hamlet. Oh, that this too, too solid flesh would
Thaw, and resolve itself into a dew!
Or that the Everlasting had not fix'd
His canon 'gainst self-slaughter! O God! O God!
How weary, stale, flat, and unprofitable
Seem to me all the uses of this world!
Fie on't! O fie! 'tis an unweeded garden,
That grows to feed: things rank and gross in nature
Possess it merely.—That it should come to this!
But two months dead! nay, not so much; not two—
So excellent a king, that was, to this,
Hyperion to a satyr: so loving to my mother,
That he permitted not the winds of heav'n
Visit her face too roughly. Heav'n and earth!
Must I remember—why, the would hang on him,
As if increase of appetite had grown
By what it fed on: yet, within a month—
Let me not think—Faintly, thy name is *Woman!*
A little month! or ere those shoes were old,
With which the follow'd my poor father's body,
Like Niobe, all tears.—why she, ev'n she—
(O heav'n! a beast, that wants discourse of reason,
Would have mourn'd longer—) married with mine
uncle,

My father's brother; but no more like my father,
Than I to Hercules. Within a month!—
Ere yet the salt of most unrighteous tears
Had left the flushing in her galled eyes,
She married.—Oh, most wicked speed, to post
With such dexterity to incestuous sheets:
It is not, nor it cannot come to good.

But break, my heart, for I must hold my tongue

Hamlet, act i. sc. 3.

"*Ford.* Hum! ha! is this a vision? is this a dream?
"do I sleep? Mr Ford, awake, awake, Mr Ford;
"there's a hole made in your best coat, Mr Ford!
"this 'tis to be married! this 'tis to have linen and
"buck baskets? Well, I will proclaim myself what
"I am; I will now take the leacher; he is at my
"house; he cannot 'scape me; 'tis impossible he
"should; he cannot creep into a half-penny purse,
"nor into a pepper-box. But lest the devil that
"guides him should aid him, I will search impossible
"places; tho' what I am I cannot avoid, yet to be
"what I would not, shall not make me tame."

Merry Wives of Windsor, act 3. sc. last.

These soliloquies are accurate and bold copies of na-
ture: in a passionate soliloquy one begins with think-
ing aloud; and the strongest feelings only, are ex-
press'd; as the speaker warms, he begins to imagine
one listening, and gradually slides into a connected dis-
course.

How far distant are soliloquies generally from these
models? So far indeed as to give disgust instead of
pleasure. The first scene of Iphigenia in Tauris dis-
covers that princess, in a soliloquy, gravely reporting
to herself her own history. There is the same impro-

propriety in the first scene of *Alceste*, and in the other introductions of Euripides, almost without exception. Nothing can be more ridiculous : it puts one in mind of a most curious device in Gothic paintings, that of making every figure explain itself by a written label issuing from its mouth. The description which a parasite, in the eunuch of *Terence* (*act 2. sc. 2.*) gives of himself, makes a sprightly soliloquy : but it is not consistent with the rules of propriety ; for no man, in his ordinary state of mind and upon a familiar subject, ever thinks of talking aloud to himself. The same objection lies against a soliloquy in the *Adelphi* of the same author, (*act 1. sc. 1.*) The soliloquy which makes the third scene *act third* of his *Heicyra*, is insufferable ; for there Pamphilus, soberly and circumstantially, relates to himself an adventure which had happened to him a moment before.

Cornelle is unhappy in his soliloquies : Take for a specimen the first scene of *Cinna*.

Racine is extremely faulty in the same respect. His soliloquies are regular harangues, a chain completed in every link, without interruption or interval : that of Antiochus in *Berenice* (*act 1. sc. 2.*) resembles a regular pleading, where the parties *pro* and *con* display their arguments at full length. The following soliloquies are equally faulty : *Bajazet*, *act 3. sc. 7* ; *Mithridate*, *act 3. sc. 4.* and *act 4. sc. 5* ; *Iphigenia*, *act 4. sc. 8.*

Soliloquies upon lively or interesting subjects, but without any turbulence of passion, may be carried on in a continued chain of thought. If, for example, the nature and sprightliness of the subject prompt a man to speak his thoughts in the form of a dialogue, the expression must be carried on without break or interruption, as in a dialogue between two persons ; which justifies Falstaff's soliloquy upon honour :

"What need I be so forward with Death, that calls not on me? Well, 'tis no matter, Honour pricks me on. But how if Honour prick me off, when I come on? how then? Can Honour set a leg? No. Or an arm? No. Or take away the grief of a wound? No. Honour hath no skill in surgery then? No. What is Honour? A word.—What is that word *ho, pour*?" Air; a trim reckoning.—Who hath it? He that dy'd a Wednesday. Doth he feel it? No. Doth he hear it? No. Is it insensible then? Yea, to the dead. But will it not live with the living? No. Why? Detraction will not suffer it. Therefore I'll none of it; honour is a mere scutcheon : and so ends my catechism.

First Part, Henry IV. act 5. sc. 2.

And even without dialogue, a continued discourse may be justified, where a man reasons in a soliloquy upon an important subject ; for if in such a case it be at all excusable to think aloud, it is necessary that the reasoning be carried on in a chain ; which justifies that admirable soliloquy in *Hamlet* upon life and immortality, being a serene meditation upon the most interesting of all subjects. And the same consideration will justify the soliloquy that introduces the 5th *act* of Addison's *Cato*.

2. Language ought not to be elevated above the tone of the sentiment.

Zara. Swift as occasion, I

Myself will fly; and earlier than the morn
Wake thee to freedom. Now 'tis late; and yet
Some news few minutes past arriv'd, which seem'd
To shake the temper of the king—Who knows
What racking cares disease a monarch's bed?
Or love, that late at night still lights his lamp,
And strikes his rays through dusk, and folded lids,
Forbidding rest, may stretch his eyes awake,
And force their balls abroad at this dead hour.
I'll try.

Mourning Bride, act 3. sc. 4.

The language here is undoubtedly too pompous and laboured for describing so simple a circumstance as absence of sleep. In the following passage, the tone of the language, warm and plaintive, is well suited to the passion, which is recent grief : but every one will be sensible, that in the last couplet save one the tone is changed, and the mind suddenly elevated to be let fall as suddenly in the last couplet :

Il déteste à jamais sa coupable victoire,
Il renonce à la cour, aux humains, à la gloire;
Et se fuyant lui-même, au milieu des déserts,
Il va cacher sa peine au bout de l'univers;
Là, soit que le soleil rendit le jour au monde,
Soit qu'il fût sa course au vaste sein de l'onde,
Sa voix faisoit redire aux echos attendris,
Le nom, le triste nom, de son malheureux fils.

Henriade, chant. viii. 229.

3. Light and airy language is unsuitable to a severe passion.

Imagery and figurative expression are discordant, in the highest degree, with the agony of a mother, who is deprived of two hopeful sons by a brutal murder. Therefore the following passage is undoubtedly in a bad taste :

Queen. Ah, my poor princes! ah, my tender babes!
My unblown flowers, new appearing sweets!
If yet your gentle souls fly in the air,
And be not fixt in doom perpetual,
Hover about me with your airy wings,
And hear your mother's lamentation.

Richard III. act 4. sc. 4.

Again,

K. Philip. You are as fond of grief as of your child.
Confiance. Grief fills the room up of my absent child,
Lies in his bed, walks up and down with me,
Puts on his pretty looks, repeats his words,
Remembers me of all his gracious parts,
Stuffs out his vacant garment with his form;
Then have I reason to be fond of grief.

King John, act 3. sc. 9.

4. Thoughts that turn upon the expression instead of the subject, commonly called a *play of words*, being low and childish, are unworthy of any composition, whether gay or serious, that pretends to any degree of elevation.

In the *Aminta* of Tasso, the lover falls into a mere play of words, demanding how he who had lost himself, could find a mistress. And for the same reason, the following passage in *Cornelle* has been generally condemned :

Chimene. Mon pere est mort, Elvire, et la première épée

Dont s'est armée Rodrigue a sa trame coupée.

Pléurez

Pleurez, pleurez, mes yeux, et fondez-vous en eau,
La moitié de ma vie a mis l'autre au tombeau,
Et m'oblige à venger, après ce coup funelle,
Celle que je n'ai plus, sur celle que me reste.

Cid, act 3. sc. 3.

To die is to be banish'd from myself:
And Sylvia is myself: banish'd from her,
Is self from self; a deadly banishment?

Two Gentlemen of Verona, act 3. sc. 3.

Countess. I pray thee, Lady, have a better cheer:
If thou engross'st all the griefs as thine,
Thou robb'st me of a moiety.

All's well that ends well, act 3. sc. 3.

K. Henry. O my poor kingdom, sick with civil
blows!

When that my care could not with-hold thy riots,
What wilt thou do when riot is thy care?
O, thou wilt be a wilderness again,
Peopled with wolves, thy old inhabitants.

Second Part, Henry IV. act 4. sc. 11.

Cruda Amarilli, che col nome ancora
D'amar, ahi lasso, amaramente infigni.

Pastor Fido, act 1. sc. 2.

Antony, speaking of Julius Cæsar:

O world! thou wast the forest of this hart;
And this, indeed, O world, the heart of thee.
How like a deer, striken by many princes,
Dost thou here lie!

Julius Cæsar, act 3. sc. 3.

Playing thus with the sound of words, which is still
worse than a pun, is the meanest of all conceits. But
Shakespeare, when he descends to a play of words,
is not always in the wrong; for it is done sometimes
to denote a peculiar character, as in the following
passage:

K. Philip. What say'st thou, boy? look in the
lady's face.

Lewis. I do, my Lord, and in her eye I find
A wonder, or a wond'rous miracle;
The shadow of myself form'd in her eye;
Which being but the shadow of your son,
Becomes a fun, and makes your son a shadow.
I do protest, I never lov'd myself
Till now infixed I beheld myself
Drawn in the flattring table of her eye.

Faulconbridge. Drawn in the flattring table of
her eye!

Hang'd in the frowning wrinkle of her brow!
And quarter'd in her heart! he doth espie
Himself Love's traitor: this is pity now,
That hang'd, and drawn, and quarter'd, there
should be,

In such a love so vile a lout as he.

King John, act 2. sc. 5.

A jingle of words is the lowest species of that low
wit; which is scarce sufferable in any case, and least of
all in an heroic poem: and yet Milton in some instances
has descended to that puerility:

And brought into the world a world of wo.

— Begirt th' Almighty throne

Beseeking or besieging —

Which tempted our attempt —

At one slight bound high overleap'd all bound.

With a shout
Loud as from numbers without number.

5. One should think it unnecessary to enter a caveat
against an expression that has no meaning, or no dis-
tinct meaning; and yet somewhat of that kind may
be found even among good writers.

Sebastian. I beg no pity for this mould'ring clay.
For if you give it burial, there it takes
Possession of your earth:

If burnt and scatter'd in the air; the winds
That strow my dust, diffuse my royalty,
And spread me o'er your clime; for where one atom
Of mine shall light, know there Sebastian reigns.

DRYDEN, Don Sebastian king of Portugal, act 1.

Cleopatra. Now; what news, my Charmion?
Will he be kind? and will he not forsake me?
Am I to live or die? nay, do I live?

Or am I dead? for when he gave his answer,
Fate took the word, and then I liv'd or dy'd.

DRYDEN, All for love, act 2.

If she be coy, and scorn my noble fire,
If her chill heart I cannot move;
Why, I'll enjoy the very love,
And make a mistress of my own desire.

COWLEY, poem inscribed, "The Request."

His whole poem, inscribed, *My picture*, is a jargon
of the same kind.

'Tis he, they cry, by whom
Not men, but war itself is overcome.

Indian Queen.

Such empty expressions are finely ridiculed in the *Re-
hearsal*.

Was't not unjust to ravish hence her breath,
And in life's stead to leave us nought but death?

Act 4. sc. 1.

PASSIONS, in *Medicine*, make one of the non-
naturals, and produce very sensible effects. Joy, an-
ger, and fear, are the principal. In the two first, the
spirits are hurried with too great vivacity; whereas,
in fear or dread, they are as it were curbed and con-
centrated: whence we may conclude, that they have
a very bad effect upon health; and therefore it will be
best to keep them within bounds as much as possible,
and to preserve an inward serenity, calmness, and tran-
quillity.

PASSIONS, in *Painting*, are the external expressions
of the different dispositions and affections of the mind;
but particularly their different effects upon the several
features of the face: for though the arms, and indeed
every part of the body*, serve likewise, by their* See *Orna-*
quick, languid, and variously diversified motions, to *ment, n° 25*
express the passions of the soul; yet, in painting, this
difference is most conspicuous in the face. See *PAINT-*
ING, n° 15. and DRAWING, art. 9.

In sorrow, joy, love, shame, and compassion, the
eyes swell all of a sudden, are covered with a super-
abundant moisture, and drop tears; and, in grief espe-
cially, the corners of the mouth hang down, the eye-
lids are half shut, and the pupil of the eye is elevated
and half covered; and all the other muscles of the face
are relaxed, so that the visage appears longer than or-
dinary.

Passion
Passport.

In fear, terror, fright, and horror, the eye-brows are greatly elevated: the eye-lids are expanded as wide as possible, so as to discover the white of the eye; and the pupil is depressed, and half covered by the lower eye-lid: the hair stands on end: the mouth is at the same time wide open; and the lips are so far drawn back, that the teeth both of the upper and under jaw appear.

Contempt is expressed by raising one side of the upper lip, so as to discover the teeth, whilst the other side has a movement like that in laughter; the eye, on that side where the teeth appear, is half shut, whilst the other remains open; however, both the pupils are depressed.

In jealousy, envy, hatred, and malice, the eye-brows are knit; and, in laughter, all the parts agree, tending as it were towards the centre of the face. See Plates XC. XCVIII.

PASSION-Flower. See PASSIFLORA.

PASSION-Week, the week immediately preceding the festival of Easter: so called, because in that week our Saviour's passion and death happened. The Thursday of this week is called *Munday Thursday*; the Friday, *Good Friday*; and the Saturday, the *Great Sabbath*.

PASSIVE, in general, denotes something that suffers the action of another, called an *agent* or *active power*. In grammar, the verb or word that expresses this passion is termed a *passive verb*: which, in the learned languages, has a peculiar termination; as *amor, doceor*, &c. in Latin; that is, an *r* is added to the actives *amo, doceo*: and, in the Greek, the inflection is made by changing *o* into *etai*; as *τις με τιμωρειται*, &c. But, in the modern languages, the passive inflection is performed by means of auxiliary verbs, joined to the participle passive; as, "I am praised," in Latin *laudor*, and in Greek *εραυνομαι*; or, "I am loved," in Latin *amor*, and in Greek *φιλομαι*. Thus it appears, that the auxiliary verb *I am*, serves to form the passives of English verbs: and the same holds of the French; as, *Je suis loué*, "I am praised;" *j'ai été loué*, "I have been praised," &c.

PASSIVE Title, in Scots law. See LAW, Part III. N° clxxx. 30.

PASSOVER, a solemn festival of the Jews, celebrated on the 14th day of the month next after the vernal equinox, and instituted in commemoration of their coming out of Egypt; because, on the night before their departure, the destroying angel, who put to death the first-born of the Egyptians, passed over the houses of the Hebrews, which were sprinkled with the blood of a lamb. The whole transaction is related in the xiiith chapter of Exodus.

PASSPORT, or Pass, a licence or writing obtained from a prince or governor, granting permission and a safe-conduct to pass through his territories without molestation. Also a permission granted by any state to navigate in some particular sea, without hindrance or molestation from it. It contains the name of the vessel, and that of the master, together with her tonnage and the number of her crew, certifying that she belongs to the subjects of a particular state, and requiring all persons at peace with that state to suffer her to proceed on her voyage without interruption.

PASTEBOARD, a kind of thick paper, formed of several fine sheets pasted one upon another. The chief use of pasteboard is for binding books, making letter-cases, &c.

PASTER of a Horse, in the menage, is the distance betwixt the joint next the foot and the coronet of the hoof. This part should be short, especially in middle-sized horses; because long pasterns are weak, and cannot so well endure travelling.

PASTERN-Joint, the joint next a horse's foot.

PASTIL, or PASTEL, among painters, a kind of paste made of different colours, ground up with gum-water, in order to make CRAYONS.

PASTIL, in pharmacy, is a dry composition of sweet-smelling resins, aromatic woods, &c. sometimes burnt to clear and scent the air of a chamber.

PASTINACA, the PARSNIP, in botany, a genus of the digynia order, belonging to the pentandria class of plants. There are only two species of this genus; the principal of which is the *pastinaca sativa*, or garden-parsnip: which is an exceeding fine sculent root. It is to be propagated by sowing the seeds in February or March, in a rich mellow soil, which must be deep dug, that the roots may be able to run deep without hindrance.

It is a common practice to sow carrots at the same time, upon the same ground with the parsneps; and if the carrots are designed to be drawn young, there is no harm in it. The parsneps, when they are grown up a little, must be thinned to a foot distance, and carefully kept clear of weeds. They are sweet tasted just at the season when the leaves are decayed; and such as are desirous to eat them in spring should have them taken up in autumn, and preserved in sand. When the seeds are to be sowed, some very strong and fine plants should be left four feet distance; and towards the end of August, or in the beginning of September, the seeds will be ripe: they must then be carefully gathered, and dried on a coarse cloth. They should always be sown the spring following; for they do not keep well.

PASTORAL, in general, something that relates to shepherds; hence we say, pastoral life, manners, poetry, &c.

PASTORAL Poetry. See POETRY, n° 63.

PASTRY, that branch of cookery which is chiefly taken up in making pies, pasties, cakes, &c.

Dr Cullen observes, that paste is very hard and indigestible without butter; and, even with it, is apt to produce heart-burn and accefcency. Perhaps this is increased by the burned butter, from a certain sensibility in the stomach, which occasions all empyreumatic oils to be long retained, and so turn rancifcent and acid.

PASTURE, or PASTURE-Land, is that reserved for feeding cattle.

Pasture-land is of such advantage to husbandry, that many prefer it even to corn-land, because of the small hazard and labour that attends it; and as it lays the foundation for most of the profit that is expected from the arable land, because of the manure afforded by the cattle which are fed upon it. Where dung is not to be bought, as is often the case in places distant from large towns, the farmer is forced to proportion the arable to the pasture land, in such a manner, that

the

Patagonia.

the cattle fed on the latter may be sufficient for a supply of dung so necessary for producing the fruits of the former.

PATAGONIA, a country of South America, comprehending all that country extending from Chili and Paraguay to the utmost extremity of South America; that is, from 35° almost to 54° of latitude: being surrounded by the countries just mentioned, the South and North Seas, and the Straits of Magellan, which separate it from the island called *Terra del Fuego*, and extend about 116 leagues in length from sea to sea, but only from half a league to three or four in breadth.

This country had the name of *Terra Magellanica*, from Ferdinand Magellan, a Portuguese officer in the service of the Catholic king, who is reported to have sailed through the straits that also bear his name, from the North to the South Sea, in the year 1510.

The lofty mountains of the Andes, which are covered with snow a great part of the year, traversing the country from north to south, the air is said to be much colder than in the north under the same parallels of latitude. Towards the north, it is said to be covered with wood, and stored with an inexhaustible fund of large timber; whereas, to the southward, not so much as a single tree fit for any mechanical purpose is to be seen: yet there is good pasture, and incredible numbers of wild horned cattle and horses, which were first brought hither by the Spaniards, and have increased amazingly. Fresh water, we are told by some writers, is very scarce; but if that were really the case, it is difficult to conceive how the present inhabitants, and such multitudes of cattle, could subsist. The east coast is mostly low land, with few or no good harbours: one of the best is Port St Julian.

Patagonia is inhabited by a variety of Indian tribes; as the Patagons, from which the country takes its name; the Pampas, the Cofares, &c. of whom we know very little. Only it appears, from the accounts of former voyagers, lately confirmed by commodore Byron and his crew, and the testimonies of other navigators, that some of them are of a gigantic stature, and clothed with skins; but it would seem that there are others who go almost quite naked, notwithstanding the inclemency of the climate. Some of them also, that live about the Straits, if we may credit the navigators who have passed that way into the South Sea, are perfect savages: but those with whom commodore Byron and his people conversed, are represented as of a more gentle humane disposition; only, like other savages, they live on fish and game, and what the earth produces spontaneously.

The Spaniards once built a fort upon the Straits, and left a garrison in it, to prevent any other European nation passing that way into the South Sea: but most of the men perished by famine, whence the place obtained the name of *Port Famine*; and no people have attempted to plant colonies here ever since.

About the middle of the Strait is a promontory called *Cape Froward*, which is the most southerly on the continent of South America.

On the coasts of Patagonia lie a great number of islands, or clusters of islands. On the west coast are the islands Madre de Dios, Santa Trinidad, Santa Cruz, the isles of the Chunians and Huillans, the Sarmientos, and many others; to the number of 80 in all, as some

say. Of those on the south coast, the most considerable are *Terra del Fuego*, and *Staten Land*. See these articles.

PATAN, a kingdom of Asia, in the East Indies, and in the peninsula of Malacca, and on the eastern coast between the kingdoms of Siam and Paha. The inhabitants are partly Mahometans and partly Gentoos; but they are all very voluptuous. The air is wholesome, though very hot; and they have no seasons but the winter and summer. The former is more properly the rainy season; and contains the months of November, December, and January. The woods are full of elephants and many wild animals. Some voyagers pretend that this country is governed by a queen, who never marries, but may have as many gallants as she pleases. They have some trade with the Chinese; and the principal town is of the same name, which is one of the strongest in these parts, having a well defended harbour.

PATAN, a town of Asia, and capital of a province of the same name, in the dominions of the Great Mogul; it is very little known. E. Long. 109. 0. N. Lat. 27. 30.

PATAVINITY, among critics, denotes a peculiarity of Livy's diction; derived from Patavium or Padua, the place of his nativity: but wherein this patavinity consists, they are by no means agreed.

PATARA, (Livy, Mela); the capital of Lycia, to the east of the mouth of the river Xanthus; famous for a temple and oracle of Apollo, thence called *Patareus*, three syllables only; but *Patareus*, (Horace). For the six winter months, Apollo gave answers at Patara; and for the six summer at Delos, (Virgil, Servius): these are the *Lycie Sortes* of Virgil. The town was situated in a peninsula, called *Lyciorum Cherfoneus*, (Stephanus).

PATAVIUM, (Tacitus, Strabo); a town of the Transpadana, situate on the left or north bank of the Medoacus Minor; founded by Antenor the Trojan, (Mela, Virgil, Seneca); *Patavini*, the people, (Livy); who himself was a native, and by Asinius Pollio charged with pativinity. Now *Padua*, in the territory and to the west of Venice. E. Long. 12. 15. N. Lat. 45. 30.

PATAY, a town of France, in the province of Orleans, remarkable for the defeat of the English in 1429, and where Joan of Arc did wonders. E. Long. 1. 43. N. Lat. 48. 5.

PATE, in fortification, a kind of platform, resembling what is called an *horse's shoe*.

PATEE, or **PATTEE**, in heraldry, a cross small in the centre, and widening to the extremes, which are very broad.

PATELLA, or **KNEE-PAN**, in anatomy. See there, n° 58.

PATELLA, the *Limpet*, a genus of insects belonging to the order of vermes testacea. It is an animal of the snail kind; the shell consists of one conical valve without any spiral. There are 36 species; principally distinguished by peculiarities in their shells.

PATENT, in general, denotes something that stand open or expanded: thus a leaf is said so be patent, when it stands almost at right angles with the stalk.

PATENT, or *Letters Patent*. See **LETTER**.
PATER.

Patant

Patent.

Pater
||
Paterculus.

PATER NOSTER, the *Lord's Prayer*, so called from the two first words thereof in Latin.

PATER NOSTER, islands of Asia, in the East Indian sea, so called because of the great number of rocks, which sailors have likened to the beads with which the Papists tell their pater-noster. They abound in corn and fruits, and are very populous.

PATER PATRATUS, in Roman antiquity, an officer chosen by one of the college of *faciales* out of their own body, to treat with an enemy on the subject of war and peace. He derived his title from a circumstance necessary to his enjoying it: for in order that he might be the more firmly interested in the fate of his country, he was to have both a father and a son living at the same time.

PATERA, among antiquaries, a goblet or vessel used by the Romans in their sacrifices; wherein they offered their consecrated meats to the gods, and where-with they made libations. See SACRIFICE and LIBATION.

The word is Latin, formed from *pateo*, "I am open;" *quid patet*, "because it has a great aperture;" in contradistinction to bottles, &c. which have only narrow necks, or whose aperture is less than the body of the vessel.

On medals the patera is seen in the hands of several deities; and frequently in the hands of princes, to mark the sacerdotal authority joined with the imperial, &c.

Hence F. Joubert observes, that beside the patera, there is frequently an altar upon which the patera seems to be pouring its contents.

The patera was of gold, silver, marble, brass, glass, or earth; and they used to inclose it in urns with the ashes of the deceased, after it had served for the libations of the wine and liquors at the funeral.

The patera is an ornament in architecture, frequently seen in the Doric freeze, and the tympanum of arches.

PATERCULUS (Caius Velleius), an ancient Roman historian, who flourished in the reign of Tiberius Cæsar, was born in the year of Rome 735. His ancestors were illustrious for their merit and their offices. His grandfather espoused the party of Tiberius Nero, the emperor's father; but being old and infirm, and not able to accompany Nero when he retired from Naples, he ran himself through with his sword. His father was a soldier of rank, and so was Paterculus himself. He was a military tribune when Caius Cæsar, a grandson of Augustus, had an interview with the king of the Parthians, in an island of the river Euphrates, in the year 753. He commanded the cavalry in Germany under Tiberius; and accompanied that prince for nine years successively in all his expeditions. He received honourable rewards from him; but we do not find that he was preferred to any higher dignity than the prætorship. The praises he bestows upon Sejanus give some probability to the conjecture, that he was looked upon as a friend of this favourite, and consequently that he was involved in his ruin. His death is placed by Mr Dodwell in the year of Rome 784, when he was in his 50th year.

He wrote an abridgment of the Roman history in two books, which is very curious. His purpose was only to deduce things from the foundation of Rome to the time wherein he lived, but he began his work with

things previous to that memorable æra: for, though Paterculus, at the beginning of his first book is wanting, we yet find in what remains of it, an account of many cities more ancient than Rome. He promised a larger history; and no doubt would have executed it well: for during his military expeditions he had seen, as he tells us, the provinces of Thrace, Macedonia, Achaia, Asia Minor, and other more easterly regions; especially upon the shores of the Euxine sea, which had furnished his mind with much entertaining and useful knowledge. In the Abridgment which we have, many particulars are related that are nowhere else to be found; and this makes it the more valuable. The style of Paterculus, though miserably disguised through the carelessness of transcribers, and impossible to be restored to purity for want of manuscripts, is yet manifestly worthy of his age, which was the time of pure Latinity. The greatest excellence of this historian lies in his manner of commending and blaming those he speaks of; which he does in the finest terms and most delicate expressions. He is, however, condemned, and indeed with the greatest reason, for his partiality to the house of Augustus; and for making the most extravagant eulogies, not only upon Tiberius, but even upon his favourite Sejanus: whom, though a vile and cruel monster, Paterculus celebrates as one of the most excellent persons the Roman commonwealth had produced. Lippius, though he praises him in other respects, yet censures him most severely for his insincerity and partiality. "Velleius Paterculus (says he), raises my indignation: he represents Sejanus as endowed with all good qualities. The impudence of this historian! But we know, that he was born, and died, to the destruction of mankind. After many commendations, he concludes, that Livia was a woman more resembling the gods than men: and as to Tiberius, he thinks it a crime to speak otherwise of him than as of an immortal Jove. What sincere and honest mind can bear this? On the other hand, how artfully does he every where conceal the great qualities of Cæsar Germanicus! how obliquely does he ruin the reputation of Agrippina and others, whom Tiberius was thought to hate! In short, he is nothing but a court-prostitute. You will say, perhaps, it was unsafe to speak the truth at those times: I grant it; but if he could not write the truth, he ought not to have written lies: none are called to account for silence." La Mothe le Vayer has made a very just remark upon this occasion: "The same fault (says he) may be observed in many others, who have written the history of their own times, with a design to be published while they lived."

It is strange, that a work so elegant and worthy to be preserved, and of which, by reason of its shortness, copies might be so easily taken, should have been so near being lost. One manuscript only has had the luck to be found, as well of this author among the Latins, as of Heclychius among the Greeks: in which, says a great critic of our own nation, "The faults of the scribes are found so numerous, and the defects so beyond all redress, that notwithstanding the pains of the learned and most acute critics for two whole centuries, these books still are, and are like to continue, a mere heap of errors." No ancient author but Prician makes mention of Paterculus: the moderns have done him infinitely more justice, and have illustrated him with notes and

and commentaries. He was first published, from the manuscript of Morbæ, by Rhenanus, at Basil in 1520: afterwards by Liplius at Leyden in 1581; then by Gerard Vossius in 1639; next by Boeclerus at Strasburg in 1642; then by Thylius and others; and, lastly, by Peter Burman at Leyden 1719, in 8vo. To the Oxford edition in 1693, 8vo, were prefixed the *Annales Velleiani* of Mr Dodwell, which show deep learning and a great knowledge of antiquity.

PATH, in general, denotes the course or track marked out or run over by a body in motion.

For the path of the moon, &c. see **ASTRONOMY**, n° 147, 155.

PATHETIC, whatever relates to the passions, or that is proper to excite or awake them. The word comes from the Greek *πάθος*, *passion*, or *emotion*. See **PASSION**.

PATHOGNOMONIC, among physicians, an appellation for a symptom, or concurrence of symptoms that are inseparable from a distemper, and are found in that only, and in no other.

PATHOLOGY, that part of medicine which explains the nature of diseases, their causes and symptoms. See **MEDICINE**.

PATHOS, a Greek term, literally signifying passion.

PATIN (Guy), professor of physic in the royal college of Paris, was born in 1602. He made his way into the world merely by the force of his genius, being at first corrector of a printing-house. He was a man of great wit and erudition: he spoke with the gravity of a Stoic, but his expressions were very satirical. He hated bigotry, superstition, and knavery; had an upright soul, and a well-disposed heart. He was a most tender father, courteous to every body, and polite in the highest degree. He died in 1672, and did not owe his reputation to any writings published in his life-time upon physic; but his letters which appeared after his death have rendered his name very famous. He left a son mentioned in the ensuing article.

PATIN (Charles), who made a great figure in the world, and excelled in the knowledge of medals. He was born in Paris in 1633; and made so surprising a progress, that he maintained theses in Greek and Latin, on all parts of philosophy, in 1647. He studied the law in compliance to an uncle, and was admitted an advocate in the parliament of Paris; but could not lay aside that of physic; for which he always had an inclination. He therefore quitted the law, and devoted himself to physic; in which, after taking the doctor's degree, he applied himself to practice, with great success. He afterwards travelled into Germany, Holland, England, Switzerland, and Italy. In 1676 he was appointed professor of physic in Padua; and three years after was created a knight of St Mark. He died in that city in 1694. His works are many, and well known to the learned world. His wife too, and his daughters, were authoresses.

PATMOS (anc. geog.), one of the Sporades (Dionysius); 30 miles in compass (Pliny); concerning which we read very little in authors. It was rendered famous by the exile of St John and the Revelation shewed him there. It is now in the hands of the Turks. It is considerable for its harbours; but the inhabitants derive little benefit from them, because the corsairs have ob-

liged them to quit the town and retire to a hill on which St John's convent stands. This convent is a citadel, consisting of several irregular towers, and is a substantial building seated on a very steep rock. The whole island is very barren, and without wood; however, it abounds with partridges, rabbits, quails, turtles, pigeons, and snipes. All their corn does not amount to 1000 barrels in a year. It is 18 miles in circumference; and there are scarce 300 men in it: but there are above 20 women to one man, who expect that all strangers who land in the island should carry some of them away. To the memory of St John, is an hermitage on the side of a mountain, where there is a chapel not above eight paces long and five broad. Over head they shew a chink in the rock, through which they pretend that the Holy Ghost distated to St John. E. Long. 26. 40. N. Lat. 37. 20.

PATNA, a town of Asia, in the dominions of the Great Mogul, and capital of a territory of the same name, to the north of the kingdom of Bengal, where the English have factories for saltpetre, borax, and raw silk. It also produces large quantities of opium. The town is large, but the houses are built at a distance from each other. It is seated in a fertile pleasant country, 400 miles east of Agra. E. Long. 85. 40. N. Lat. 25. 25.

PATANCE, in heraldry, is a cross, flory at the ends; from which it differs only in this, that the ends, instead of turning down like a fleur de lis, are extended somewhat in the pattee form. See **FLORY**.

POTOMACK, a large river of North America, in Virginia, which rises in the Alleghany mountains, separates Virginia from Maryland, and falls into Chesapeake bay. It is about seven miles broad, and is navigable for near 200 miles.

PATRANA, or **PASTRANA**, a town of New Castile in Spain, with the title of a duchy. It is seated between the rivers Tajo and Tejana, in E. Lon. 0. 15.

PATRAS, an ancient and flourishing town of European Turkey, in the Morea, capital of a duchy, with a Greek archbishop's see. It is pretty large and populous; and the Jews, who are one third part of the inhabitants, have four synagogues. There are several handsome mosques and Greek churches. The Jews carry on a great trade in silk, leather, honey, wax, and cheese. There are cypress trees of a prodigious height, and excellent pomegranates, citrons, and oranges. It has been several times taken and retaken, and it is just now in the hands of the Turks. It is seated in E. Long. 21. 57. N. Lat. 38. 20.

PATRICA, a town of Italy in the territory of the church, and in the Campagna of Rome, towards the sea-coast, and eight miles east of Ostia. About a mile from this place is a hill called *Monte di Livano*, which some have thought to be the ancient Lavinium founded by Æneas.

PATRES CONSCRIPTI. See **CONSCRIPT** and **SENATOR**.

PATRIARCH, **PATRIARCHA**, one of those first fathers who lived towards the beginning of the world, and who became famous by their long lines of descendants. Abraham, Isaac, and Jacob, and his twelve sons, are the patriarchs of the Old Testament; Seth, Enoch, &c. were antediluvian patriarchs.

PATRIARCHS, among Christians, are ecclesiastical dig-

Patriarchs

Patriarch.

dignitaries, or bishops, so called from their paternal authority in the church. The power of patriarchs was not the same in all, but differed according to the different customs of countries, or the pleasures of kings and councils. Thus the patriarch of Constantinople grew to be a patriarch over the patriarchs of Ephesus and Caesarea, and was called the *ecumenical and universal patriarch*; and the patriarch of Alexandria had some prerogatives which no other patriarch but himself enjoyed, such as the right of consecrating and approving every single bishop under his jurisdiction.

PATRIARCHAL cross, in heraldry, is that where the shaft is twice crossed; the lower arms being longer than the upper ones.

PATRICIAN, among the ancient Romans, a title given to the descendants of the hundred, or, according to others, of the two hundred first senators chosen by Romulus, and by him called *pateres*, "fathers."

PATRICK (St), the apostle of Ireland, and second bishop of that country in the 5th century. At 16 years of age he was made a slave, and continued to be for six years. Then he became a disciple of St Martin of Tours, who ordained him priest, and sent him into Ireland, where he laboured successfully for 60 years in converting the inhabitants.

PATRICK (Simon), a very learned English bishop, was born at Gainsborough in Lincolnshire in 1626. In 1644 he was admitted into Queen's college, Cambridge, and entered into holy orders. After being for some time chaplain to Sir Walter St John, and vicar of the church at Battersea in Surrey, he was preferred to the rectory of St Paul's, Covent-garden, in London, where he continued all the time of the plague in 1665 among his parishioners, to their great comfort. In 1668 he published his *Friendly Debate* between a Conformist and a Non-conformist. This was answered by the Dissenters, whom he had much exasperated by it; but by his moderation and candour toward them afterwards, they were perfectly reconciled to him, and he brought over many of them to the communion of the established church. In 1678 he was made dean of Peterborough, where he was much beloved. In 1682, Dr Lewis de Moulin, who had been a history-professor at Oxford, and written many bitter books against the church of England, sent for Dr Patrick upon his sick-bed, and made a solemn declaration of his regret on that account, which he signed, and it was published after his death. During the reign of king James, the dean's behaviour shewed that he had nothing more at heart than the Protestant religion; for which he ventured all that was dear to him, by preaching and writing against the errors of the church of Rome. In 1687 he published a prayer composed for that difficult time, when persecution was expected by all who stood firm to their religion. The year after the Revolution, the dean was appointed bishop of Chichester, and was employed with others of the new bishops to settle the affairs of the church in Ireland. In 1691 he was translated to the see of Ely, in the room of the deposed bishop Turner. He died in 1707, after having published various works; among which the most distinguished are his *Paraphrases and Commentaries on the holy scriptures*, 3 volumes folio. These, with Louth on the proverbs, Arnold on the Apocrypha,

and Whitby on the New Testament, make a regular continued commentary in English on all the sacred books.

PATRIMONY, a right or estate inherited by a person from his ancestors.

The term *patrimony* has been also given to church-estates or revenues; in which sense authors still say, the patrimony of the church of Rimini, Milan, &c. The church of Rome hath patrimonies in France, Africa, Sicily, and many other countries. To create the greater respect to the estates belonging to the church, it was usual to give their patrimonies the names of the saints they held in the highest veneration: thus the estate of the church of Ravenna was called the *patrimony of St Apollinaris*; that of Milan, the *patrimony of St Ambrose*; and the estates of the Roman church were called the *patrimony of St Peter in Abruzzo*, the *patrimony of St Peter in Sicily*, and the like.

What is now called *St Peter's patrimony* is only the duchy of Castro, and the territory of Orvietto. See CASTRO, &c.

PATRIPASSIANS, *PATRIPASSIANI*, in church-history, a Christian sect, who appeared about the latter end of the 2d century; so called, from their ascribing the passion to the Father: for they asserted the unity of God in such a manner as to destroy all distinctions of persons, and to make the Father and Son precisely the same; in which they were followed by the Sabellians and others. The author and head of the Patripassians was Praxeas, a philosopher of Phrygia in Asia.

PATROL, in war, a round or march made by the guards or watch in the night-time, to observe what passes in the streets, and to secure the peace and tranquillity of a city or camp. The patrol generally consists of a body of five or six men, detached from a body on guard, and commanded by a serjeant.

They go every hour of the night, from the beating of the tattoo until the reveille: they are to walk in the streets in garrisons, and all over the camp in the field, to prevent disorders, or any number of people from assembling together: they are to see the lights in the soldiers barracks put out, and to take up all the soldiers they find out of their quarters. Sometimes patrols consist of an officer and 30 or 40 men, as well infantry as cavalry; but then the enemy is generally near at hand, and consequently the danger greater.

PATRON, among the Romans, was an appellation given to a master who had freed his slave. As soon as the relation of master expired, that of patron began: for the Romans in giving their slaves their freedom, did not deposite themselves of all rights and privileges in them; the law still subjected them to considerable services and duties towards their patrons, the neglect of which was very severely punished.

Patron was also a name which the people of Rome gave to some great man, under whose protection they usually put themselves; paying him all kinds of honour and respect, and denominating themselves his clients; while the patron, on his side, granted them his credit and protection.

PATRON, in the church of Rome, a saint, whose name a person bears, or under whose protection he is put, and whom he takes particular care to invoke: or

Patrimony

Patron.

Patronage, a faint, in whose name a church or order is founded.

PATRON, in the canon and common law, is a person, who having the advowson of a parsonage, vicarage, or the like spiritual promotion, belonging to his manor, hath, on that account, the gift and disposition of the benefice, and may present to it whenever it becomes vacant. The patron's right of disposing of a benefice, originally arises either from the patron, or his ancestors, &c. being the founders or builders of the church; from their having given lands for the maintenance thereof; or, from the church's being built on their ground; and frequently from all three together.

PATRONAGE, or ADVOWSON, a sort of incorporeal hereditament, consisting in the right of presentation to a church or ecclesiastical benefice. Advowson, *advocatio*, signifies in *clientelam recipere*, the taking into protection; and therefore is synonymous with patronage, *patronatus*; and he who has the right of advowson is called the *patron* of the church. For, when lords of manors first built churches on their own demesnes, and appointed the tithes of those manors to be paid to the officiating ministers, which before were given to the clergy in common (from whence arose the division of parishes), the lord, who thus built a church, and endowed it with glebe or land, had of common right a power annexed of nominating such minister as he pleased, (provided he were canonically qualified), to officiate in that church, of which he was the founder, endower, maintainer, or, in one word, the patron.

Advowsons are either advowsons *appendant*, or advowsons *in gross*. Lords of manors being originally the only founders, and of course the only patrons, of churches, the right of patronage or presentation, so long as it continues annexed to the possession of the manor, as some have done from the foundation of the church to this day, is called an *advowson appendant*; and it will pass, or be conveyed, together with the manor, as incident and appendant thereto, by a grant of the manor only, without adding any other words. But where the property of the advowson has been once separated from the property of the manor, by legal conveyance, it is called an *advowson in gross*, or at large, and never can be appendant any more; but is for the future annexed to the person of its owner, and not to his manor or lands.

Advowsons are also either *presentative*, *collative*, or *donative*. And advowson presentative is where the patron hath a right of presentation to the bishop or ordinary, and moreover to demand of him to institute his clerk if he finds him canonically qualified: and this is the most useful advowson. An advowson collative is where the bishop and patron are one and the same person: in which case the bishop cannot present to himself; but he does, by the one act of collation, or conferring the benefice, the whole that is done in common cases, by both presentation and institution. An advowson donative is when the king, or any subject by his licence, doth found a church or chapel, and ordains that it shall be merely in the gift or disposal of the patron; subject to his visitation only, and not to that of the ordinary; and vested absolutely in the clerk by the patron's deed of donation, without presentation, institution, or induction. This is said

to have been anciently the only way of conferring ecclesiastical benefices in England; the method of institution by the bishop not being established more early than the time of archbishop Becket in the reign of Henry II. and therefore, though pope Alexander III. in a letter to Becket, severely inveighs against the *prava consuetudo*, as he calls it, of investiture conferred by the patron only, this however shews what was then the common usage. Others contend, that the claim of the bishops to institution is as old as the first planting of Christianity in this island; and in proof of it they allege a letter from the English nobility to the pope in the reign of Henry the third, recorded by Matthew Paris, which speaks of presentation to the bishop as a thing immemorial. The truth seems to be, that, where the benefice was to be conferred on a mere layman, he was first presented to the bishop in order to receive ordination, who was at liberty to examine and refuse him; but where the clerk was already in orders, the living was usually vested in him by the sole donation of the patron; till about the middle of the 12th century, when the pope and his bishops endeavoured to introduce à kind of feudal dominion over ecclesiastical benefices, and, in consequence of that, began to claim and exercise the right of institution universally, as a species of spiritual investiture.

However this may be, if, as the law now stands, the true patron once waives this privilege of donation, and presents to the bishop, and his clerk is admitted and instituted, the advowson is now become for ever presentative, and shall never be donative any more. For these exceptions to general rules and common right, are ever looked upon by the law in an unfavourable view, and construed as strictly as possible. If therefore the patron, in whom such peculiar right resides, does once give up that right, the law, which loves uniformity, will interpret it to be done with an intention of giving it up for ever; and will therefore reduce it to the standard of other ecclesiastical livings. See further, LAW, Part III. N^o clix. 5.—9.

Arms of PATRONAGE, in heraldry, are those on the top of which are some marks of subjection and dependence: thus the city of Paris bears the fleurs de lis in chief, to shew her subjection to the king; and the cardinals, on the top of their arms, bear those of the pope, who gave them the hat, to shew that they are his creatures.

PATRONYMIC, among grammarians, is applied to such names of men or women as are derived from those of parents or ancestors.

Patronymics are derived, 1. From the father; as Pelides, *i. e.* Achilles the son of Peleus. 2. From the mother; as Philyrides, *i. e.* Chiron the son of Philyra. 3. From the grandfather on the father's side; as Æacides, *i. e.* Achilles the grandson of Æacus. 4. From the grandfather by the mother's side; as Atlantiades, *i. e.* Mercury the grandson of Atlas. And, 5. From the kings and founders of nations; as Romulides, *i. e.* the Romans from their founder king Romulus.

The termination of Greek and Latin patronymics are chiefly four, *viz. der*, of which we have examples above; *as*, as Thaumantias, *i. e.* Iris the daughter of Thamaus; *is*, as Atlautis, *i. e.* Electra the daughter

Black.
Comment.

Patronage.
Patronymic

of Atlas; and *ne*, as Nerine, the daughter of Nereus. Of the terminations *des* is masculine; and *as*, *is*, and *ne*, feminine: *des* and *ne* are of the first declension, *as* and *is* of the third.

PATROS, (Jeremiah, Ezekiel), appears from the context to be meant of a part of Egypt. Bockart thinks it denotes the Higher Egypt: the Septuagint translate it the country of *Pathure*; in Pliny we have the *Nomos Pathurites* in the Thebais; in Ptolemy, *Pathyris*, probably the metropolis. From the Hebrew appellation *Patros* comes the gentilitious name *Pathrusim*, Moses.

PATRU (Oliver), a counsellor in parliament, and dean of the French academy, was born at Pairs in 1604. He had an excellent faculty both of speaking and writing. Upon his admission into the French academy in 1640, he made an oration of thanks, that gave rise to the custom of admilatory speeches, which are still in use in that society. Mr de Vaugilas owns himself much indebted to him for his assistance in composing his Remarks on the French tongue, of which he was by far the greatest master in France; so that he was consulted as an oracle by all the best writers of that nation.

Patru was estimable for the qualities of his heart, as well as for those of the head: was honest, generous, sincere; and preserved a gayness of character, which no ill-fortune could alter or affect. For this famous advocate, in spite of all his great talents, lived almost in a state of indigence. The love of the belles lettres made him neglect the law; and the barren glory of being an oracle to the best French writers had more charms for him, than all the profits of the bar. Hence he became so poor, as to be reduced to the necessity of selling his books, which seemed dearer to him than his life; and would actually have sold them for an under-price, if Boileau had not generously advanced him a larger sum, with this further privilege, that he should have the use of them as long as he lived. His death was preceded by a tedious illness, during which he received a present of 500 crowns from Colbert, as a mark of the esteem which the king had for him. He died the 16th of January 1681. The prodigious care and exactness with which he touched and finished every thing he wrote, did not permit him to publish much. His miscellaneous works were printed at Paris in 1670, 4to; the third edition of which, in 1714, 4to, was augmented with several pieces. They consist of Pleadings, Orations, Letters, Lives of some of his friends, Remarks upon the French language, &c.

PAU, a handsome town of France, in the province of Gascony and territory of Bearn, with a parliament, a mint, and a castle where Henry IV. was born. It is seated on an eminence, at the foot of which runs the river Gave. W. Long. o. 29. N. Lat. 43. 15.

PAVIA, an ancient and celebrated town of Italy, in the duchy of Milan, and capital of the Pavetan, with an university and bishop's see. It is defended by strong walls, large ditches, good ramparts, excellent bastions, and a bridge over the river Tassin. In the centre of the town is a strong castle, where the duke of Milan was wont to reside. There are a great number of magnificent castles, and some colleges. It was

taken by the duke of Savoy in 1706; by the French in 1733; by the French and Spaniards in 1745; but retaken by the Austrians in 1746. E. Long. 9. 5. N. Lat. 45. 10

PAVILION, in architecture, signifies a kind of turret or building, usually insulated, and contained under a single roof; sometimes square, and sometimes in form of a dome: thus called from the resemblance of its roof to a tent.

Pavilions are sometimes also projecting pieces, in the front of a building, marking the middle thereof; sometimes the pavilion flanks a corner, in which case it is called an *angular pavilion*. The Louvre is flanked with four pavilions: the pavilions are usually higher than the rest of the building. There are pavilions built in gardens, commonly called *summer-houses*, *pleasure-houses*, &c. Some castles or forts consist only of a single pavilion.

PAVILION, in military affairs, signifies a tent raised on posts, to lodge under in the summer time.

PAVILION, is also sometimes applied to flags, colours, ensigns, standards, banners, &c.

PAVILION, in heraldry, denotes a covering in form of a tent, which invests or wraps up the armories of divers kings and sovereigns, depending only on God and their sword.

The pavilion consists of two parts; the top, which is the chapeau, or coronet; and the curtain, which makes the mantle.

None but sovereign monarchs, according to the French heralds, may bear the pavilion entire, and in all its parts. Those who are elective, or have any dependence, say the heralds, must take off the head, and retain nothing but the curtains.

PAVILIONS, among jewellers, the undersides and corners of the brilliants, lying between the girdle and the collet.

PAUL (St) the apostle, was born at Tarsus in Cilicia, of Jewish parents. He was educated at Tarsus; which, as Strabo informs us, excelled Alexandria, Athens, and Rome itself, for polite learning. Thence he was sent to Jerusalem, to study the law under Gamaliel. Here he became a Pharisee, and engaged in a violent persecution; but was wonderfully converted in his way to Damascus. After which he preached the gospel in various parts, until he was at last sent to Rome, where he is said to have converted Poppea Sabina, Nero's concubine; for which Nero being enraged against him, commanded him to be beheaded.

PAUL, first bishop of Narbonne, or Sergius Paulus the proconsul, converted and made bishop by St Paul, was defended from one of the best families of Rome. It is said the apostle called himself *Paul* from his name. The Spaniards will have him to be their apostle, which is not improbable; and it is said he died a martyr at Narbonne.

PAUL (Father), was born at Venice in 1552. He was educated by his uncle Ambrosio Morelli, and soon made great progress in learning. He was remarkable for two qualities, which seldom meet in the same person; a strong memory, and clear judgment. He took upon him the habit of the Servites in 1566. Upon entering into this order, he changed his name of *Peter Sarpi* for that of *Paul*. He was afterwards chaplain

Paul
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Pavo.

chaplain to the duke of Mantua, and reader of positive and casuistical divinity and canon law in that city. So he became a perfect master of the Hebrew language and of history; but shewed the utmost contempt for judicial astrology. When weary of a court life, he returned to his convent at Venice; and so intensely applied himself to study, that he injured his health by it. He was chosen provincial of his order for the province of Venice at 26 years of age; and discharged this post with such honour, that 1759 he was appointed, with two others, to draw up new regulations and statutes for his order. This he executed with great success; and when his office of provincial was expired, he retired for three years to the study of natural and experimental philosophy and anatomy, in which he is said to have made some useful discoveries. He was then chosen procurator-general of his order; and during his residence at Rome was greatly esteemed by pope Sixtus V. and contracted an intimate friendship with cardinal Bellarmine and other eminent persons. Some time after, he was accused of heresy; and brought into a series of troubles, which he supported with exemplary patience and magnanimity; till at length, growing extremely odious to the pope's party, he was assassinated, and left for dead, by five ruffians, who retired to the palace of the pope's nuncio in Venice, from whence they escaped to Ravenna or Ferrara. These circumstances discovered who were concerned in this attempt. He recovered, however, of his wounds; and retired to a place of security, where he wrote his history of the council of Trent, which he compiled principally for the sake of king James I. of England, with whom he corresponded. His name, ever since the interdict, was become famous all over Europe; and two kings made him very advantageous offers to reside in their dominions. He died as he had lived, with piety and resignation, in 1623. He was a good controversial writer, a judicious and elegant historian.

PAULIONISTS, in church-history, Christian heretics of the third century, disciples of Paul Samotensis bishop of Antioch, who denied Christ's divinity; maintaining, that, when we call him the Son of God, we do not therefore mean that he is truly and really God; but only that he was so perfect a man, and so superior in virtue to all others, that he had this name given him by way of eminence.

PAULICIANS, Christian heretics of the seventh century, disciples of one Constantine a native of Armenia, and a favourer of the errors of Manes; who, as the name *Manichee* was become odious, gave those of his sect the name of *Paulicians*, on the pretence that they followed only the doctrine of St Paul.

PAVO, the **PEACOCK**, in ornithology; a genus belonging to the order of gallinæ. The head is covered with feathers which bend backwards; the feathers of the tail are very long, and beautifully variegated with eyes of different colours. There are three species.

1. The cristatus, or common peacock of English authors, has a compressed crest and solitary spurs. It is a native of India; and we are assured, that they are still found in a wild state in the islands of Ceyland and Java. So beautiful a bird could not long be permitted to be a stranger in the more distant parts: for so early

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as the days of Solomon, we find, among the articles imported in his Tarshish navies, apes and peacocks. A monarch so conversant in all branches of natural history, "who spoke of trees, from the cedar of Lebanon, even unto the hyssop that springeth out of the wall; who spoke also of beasts and of fowl," would certainly not neglect furnishing his officers with instructions for collecting every curiosity in the countries they voyaged to, which gave him a knowledge that distinguished him from all the princes of his time. *Ælian* relates, that they were brought into Greece from some barbarous country; and that they were held in such high esteem, that a male and female were valued at Athens at 1000 drachmæ, or 32 l. 5 s. 10 d. Their next step might be to Samos; where they were preferred about the temple of Juno, being the birds sacred to the goddess: and *Gellius*, in his *Noctes Atticæ*, c. 16. commends the excellency of the Samian peacocks. It is therefore probable, that they were brought here originally for the purposes of superstition, and afterwards cultivated for the uses of luxury. We are also told, when Alexander was in India, he found vast numbers of wild ones on the banks of the Hyarotis; and was so struck with their beauty, as to appoint a severe punishment on any person that killed them.

Peacock's crests, in ancient times, were among the ornaments of the kings of England. *Ernald de Acclent* was fined to king John in 140 palfries, with fackbuts, lorains, gilt spurs, and peacock's crests, such as would be for his credit.

2. The bicalcaratus has a small crest and double spurs. It is a native of China.

3. The muticus has a sharp-pointed crest, and no spurs; the orbits of the eyes are red. It is found in Japan.

PAVO, in astronomy. See **ASTRONOMY**, n° 206.

PAUREDASTYLÆ, in natural history, the name of a genus of perfect crystals with double pyramids, and no intermediate column, composed of 12 planes, or two hexangular pyramids joined base to base.

PAUSANIA, in Grecian antiquity, a festival in which were solemn games, wherein nobody contended but free-born Spartans; in honour of Pausanias the Spartan general, under whom the Greeks overcame the Persians in the famous battle of Platæa.

PAUSANIAS, a learned Greek historian and orator, in the second century, under the reign of Antoninus the philosopher, was the disciple of Herodotus Atticus. He lived for a long time in Greece; and afterwards went to Rome, where he died at a great age. He wrote an excellent Description of Greece, in ten books; in which we find not only the situation of places, but the antiquities of Greece, and every thing most curious and worthy of knowledge. *Abbé Gedin* has given a French translation of it, in 2 vols 4to.

PAUSE, a stop or cessation in speaking, singing, playing, or the like. One use pointing in grammar is to make proper pauses, in certain places. There is a pause in the middle of each verse; in an hemistich, it is called a *reſt* or *reſpoſe*. See **POETRY**, n° 118, &c. and **READING**, n° xi.

PAW, in the manege. A horse is said to paw the ground, when, his leg being either tired or painful, he

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does

Pavo
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Paw.

does not rest it upon the ground, and fears to hurt himself as he walks.

PEA, in botany. See PISUM.

PEACH, in botany. See AMYGDALUS.

PEACOCK, in ornithology. See PAVO.

PEAK of DERBYSHIRE, a chain of very high mountains in the county of Derby is England, famous for the mines they contain, and for their remarkable caverns. The most remarkable of these are Pool's-hole and Elden-hole. The former is a cave at the foot of a high hill called *Caitness*, so narrow at the entrance that passengers are obliged to creep on all-fours; but it soon opens to a considerable height, extending to above a quarter of a mile, with a roof somewhat resembling that of an ancient cathedral. By the petrifying water continually dropping in many parts of the cave are formed a variety of curious figures and representations of the works both of nature and art. There is a column here as clear as alabaster, which is called the *Queen of Scots Pillar*, because Queen Mary is said to have proceeded thus far when she visited the cavern. If a pistol is fired by this pillar, it will make a report as loud as a cannon. Near the extremity there is a hollow in the roof, called the *Needle's eye*; in which if a candle is placed, it will represent a star in the firmament to those who are below. At a little distance from this cave is a small clear stream consisting of hot and cold water, so near each other, that the finger and thumb of the same hand may be put, the one into the hot water, and the other into the cold.

Elden-hole is a dreadful chasm in the side of a mountain; which, before the latter part of the last century, was thought to be altogether unfathomable. In the time of queen Elizabeth, a poor man was let down into it for 200 yards; but he was drawn up in a frenzy, and soon after died. In 1682, it was examined by Captain Collins, and in 1699 by Captain Sturmy, who published their accounts in the Philosophical Transactions. The latter descended by ropes fixed at the top of an old lead-ore pit, four fathoms almost perpendicular, and from thence three fathoms more obliquely, between two great rocks. At the bottom of this he found an entrance into a very spacious cavern, from whence he descended along with a miner for 25 fathoms perpendicular. At last they came to a great river or water, which he found to be 20 fathoms broad and eight fathoms deep. The miner who accompanied him, insisted that this water ebbed and flowed with the sea; but the Captain disproved this assertion by remaining in the place from three hours flood to two hours ebb, during which time there was no alteration in the height of the water. As they walked by the side of this water, they observed a hollow in the rock some feet above them. The miner went into this place, which was the mouth of another cavern; and walked for about 70 paces in it, till he just lost sight of the Captain. He then called to him, that he had found a rich mine; but immediately after came running out and crying, that he had seen an evil spirit; neither could any persuasions induce him to return. The floor of these caverns is a kind of white stone enamelled with lead ore, and the roofs are encruited with shining spar. On his return from this subterraneous journey, Captain Sturmy was seized with a

violet head-ach, which, after continuing four days, terminated in a fever, of which he died in a short time.

A few years ago this cavern was visited by the late Mr James Fergulson: who tells us, that it consists of two hollows one over another; but that the mouth of the lowermost is now stopped up by planks of timber laid across it, on which are a heap of stones thrown in at the upper mouth with a design to fill up the cavern entirely; which, however, will probably be never accomplished on account of its vast size.

PEAR, in heraldry, is when the field of a coat of arms is sable, and the powderings or.

PEAR, in botany. See PYRUS.

PEARCE (Dr), lord bishop of Rochester, was the son of a distiller in High Holborn. He married Miss Adams, the daughter of a distiller in the same neighbourhood, with a considerable fortune, who lived with him 52 years in the highest degree of connubial happiness. He had his education in Westminster school, where he was distinguished by his merit, and elected one of the king's scholars. In 1710, when he was 20 years old, he was elected to Trinity College, Cambridge. During the first years of his residence at the university, he sometimes amused himself with lighter compositions, some of which are inserted in the *Guardian* and *Spectator*. In 1716, he published his edition of *Cicero de Oratore*, and, at the desire of a friend, luckily dedicated it to Lord Chief Justice Parker, (afterwards Earl of Macclesfield,) to whom he was a stranger. This incident laid the foundation of his future fortune: for Lord Parker soon recommended him to Dr Bentley, master of Trinity, to be made one of the fellows; and the doctor consented to it on this condition, that his lordship would promise to *unmake* him again as soon as it lay in his power to give him a living. In 1717, Mr Pearce was ordained at the age of 27; having taken time enough, as he thought, to attain a sufficient knowledge of the sacred office. In 1718, Lord Parker was appointed chancellor, and invited Mr Pearce to live with him in his house as chaplain. In 1719, he was instituted into the rectory of Stapleford Abbots, in Essex; and in 1720, into that of St Bartholomew, behind the Royal Exchange, worth 400 l. *per annum*. In 1723, the lord chancellor presented him to St Martin's in the Fields. His Majesty, who was then at Hanover, was applied to in favour of St Claget, who was then along with him; and the doctor actually kissed hands upon the occasion: but the chancellor, upon the king's return, disputed the point, and was permitted to present Mr Pearce.—Mr Pearce soon attracted the notice and esteem of persons in the highest stations and of the greatest abilities. Beside Lord Parker, he could reckon amongst his patrons or friends, Lord Macclesfield, Mr Pulteney (afterwards Earl of Bath), archbishop Potter, Lord Hardwicke, Sir Isaac Newton, and other illustrious personages.—In 1724, the degree of doctor of divinity was conferred on him by archbishop Wake. The same year he dedicated to his patron, the Earl of Macclesfield, his edition of *Longinus on the Sublime*, with a new Latin version and notes.

When the church of St Martin's was rebuilt, Dr Pearce preached a sermon at the consecration, which he

Pearce. he afterwards printed, and accompanied with an essay on the origin and progress of temples, traced from the rude stones which were first used for altars, to the noble structure of Solomon, which he considers as the first temple completely covered. His observations on that building, which is called the *temple of Dagon*, removes part of the difficulty which presents itself in the narration of the manner in which Samson destroyed it.

The deanry of Winchester becoming vacant, Dr Pearce was appointed dean in 1739; and in the year 1744 he was elected prolocutor of the lower house of convocation for the province of Canterbury. His friends now began to think of him for the episcopal dignity; but Mr Dean's language rather declined it. However, after several difficulties had been started and removed, he consented to accept the bishopric of Bangor, and promised Lord Hardwicke to do it with a good grace. He accordingly made proper acknowledgments of the royal goodwills, and was consecrated Feb. 12. 1748. Upon the declining state of health of Dr Wilcocks, bishop of Rochester, the bishop of Bangor was several times applied to by archbishop Herring to accept of Rochester, and the deanry of Westminster, in exchange for Bangor; but the bishop then first signified his desire to obtain leave to resign and retire to a private life. His lordship, however, upon being pressed, suffered himself to be prevailed upon.—“My Lord,” said he to the Duke of Newcastle, “your grace offers these dignities to me in so generous and friendly a manner, that I promise you to accept them.” Upon the death of bishop Wilcocks he was accordingly promoted to the see of Rochester and deanry of Westminster in 1756. Bishop Sherlock died in 1761, and Lord Bath offered his interest for getting the bishop of Rochester appointed to succeed him in the diocese of London; but the bishop told his lordship, that he had determined never to be bishop of London or archbishop of Canterbury.

In the year 1763, his lordship being 73 years old, and finding himself less fit for the business of his stations as bishop and dean, informed his friend lord Bath of his intention to resign both, and live in a retired manner upon his private fortune. Lord Bath undertook to acquaint his majesty; who named a day and hour, when the bishop was admitted alone into the closet. He told the king, that he wished to have some interval between the fatigues of business and eternity; and desired his majesty to consult proper persons about the propriety and legality of his resignation. In about two months the king informed him, that Lord Mansfield saw no objection; and that Lord Northampton, who had been doubtful, on farther consideration thought that the request might be complied with. Unfortunately for the bishop, lord Bath applied for bishop Newton to succeed. This alarmed the ministry, who thought that no dignities should be obtained but through their hands. They therefore opposed the resignation; and his majesty was informed that the bishops disliked the design. His majesty sent to him again; and at a third audience told him, that he must think no more of resigning. The bishop replied, “Sir, I am all duty and submission;” and then retired.

In 1768 he obtained leave to resign the deanry; in 1773, he lost his lady; and after some months of lingering decay, he died at Little Ealing, June 29, 1774.

This eminent prelate distinguished himself in every part of his life by the virtues proper to his station. His literary abilities, and application to sacred and philological learning, appear by his works; the principal of which are, A letter to the clergy of the church of England, on occasion of the bishop of Rochester's commitment to the Tower, 2d ed. 1722. Miracles of Jesus vindicated, 1727 and 1728. A review of the text of Milton, 1733. Two letters against Dr Middleton, occasioned by the doctor's letter to Waterland, on the publication of his treatise, intitled *Scripture Vindicated*, 3d edit. 1752. And since his death, a commentary with notes on the four Evangelists and the Acts of the Apostles, together with a new translation of St Paul's first Epistle to the Corinthians, with a paraphrase and notes, have been published, with his life prefixed, from original MSS. in 2 vols 4to.

PEARCH, in ichthyology. See PERCA.

The perch affords good sport for the angler. The best time for their biting is when the spring is over, and before the heats of summer come on. At this time they are very greedy; and the angler, with good management, may take at one standing all that are in the hole, be they ever so many.

The proper baits are a minnow or young frog; but the worm called the *brandling*, well powdered, is also excellent at all times of the year. When the perch bites, he should always have a great deal of time allowed him to swallow the bait.

The perch will bite all day long, if the weather be cloudy; but the best time is from eight to ten in the morning, and from three till six in the afternoon. The perch is very abstemious in winter, and will seldom bite in this season of the year; if he does at all, it is in the middle of the day: at which time indeed all fish bite best at that season.

If the bait be a minnow, which is the bait that affords most diversion to the angler, it must be fastened to the hook alive, by putting the hook through the upper lip or back-fin; it must be kept at about mid-water, and the float must be a quill and a cork, that the minnow alone may not be able to sink it.

The line must be of silk, and strong; and the hook armed with a small and fine wire, that if a pike should take the bait, as is not unfrequently the case, he may be taken. The way to carry the minnows or small gudgeons alive for baits is this: A tin-pot is to be provided, with holes in the lid, and filled with water; and the fish being put in this, the water is to be changed once in a quarter of an hour by the holes, without taking off the lid at any time, except when the bait is to be taken out.

A small calling-net, made for these little fish, should be taken out with the perch-tackle; and one or two casts of this will take baits enough for the day, without any farther trouble. When the bait is a frog, the hook is to be fastened to the upper part of the leg. The best place for the fishing for perch is in the turn of the water near some gravelly scour. A place of this kind being pitched upon, it should be baited over-night with lobworms chopped to pieces; and in the morning, on going to it, the depth is to be regularly plumbed, and then the hook is to be baited with the worm or other bait; and as it draws along, the perch will soon seize upon it.

PEARCH-Glue, the name of a kind of glue, of remarkable strength and purity, made from the skins of pearches.

PEARL, in natural history, a hard, white, shining body, usually roundish, found in a testaceous fish resembling an oyster.

Pearls, though esteemed of the number of gems by our jewellers, and highly valued, not only at this time, but in all ages, proceed only from a distemper in the creature that produces them, analogous to the bezoars, and other stony concretions in several animals of other kinds.

The fish in which these are usually produced is the East-Indian pearl-oyster, as it is commonly called. Besides this shell, there are many others that are found to produce pearls; as the common oyster, the muscle, and several others; the pearls of which are often very good; but those of the true Indian berberi, or pearl-oyster, are in general superior to all. The small or seed-pearls, also called *ounce-pearls*, from their being sold by the ounce and not by tale, are vastly the most numerous and common: but, as in diamonds, among the multitudes of small ones, there are smaller numbers and larger found, so in pearls there are larger and larger kinds; but as they increase in size, they are proportionably less frequent; and this is one reason of their great price. We have Scotch pearls frequently as big as a little tare, some as big as a large pea, and some few of the size of a horse-bean; but these are usually of a bad shape, and of little value in proportion to their weight. Philip II. of Spain had a pearl perfect in its shape and colour, and of the size of a pigeon's egg. The finest, and what is called the true shape of the pearl, is a perfect round; but if pearls of a considerable size, are of the shape of a pear, as is not unfrequently the case, they are not less valued, as they serve for ear-rings and other ornaments. Their colour ought to be a pure white; and that not a dead and lifeless, but a clear and brilliant one: they must be perfectly free from any foulness, spot, or stain; and their surfaces must be naturally smooth and glossy; for they bring their natural polish with them, which art is not able to improve.

All pearls are formed of the matter of the shell, and consist of a number of coats spread with perfect regularity one over another, in the manner of the several coats of an onion, or like the several strata of the stones found in the bladders or stomachs of animals, only much thinner.

Manner of fishing for PEARLS in the East Indies. There are two seasons for pearl-fishing: the first is in March and April, and the last in August and September; and the more rain there falls in the year, the more plentiful are these fisheries. At the beginning of the season there are sometimes 250 barks on the banks; the larger barks have two divers, and the smaller one. As soon as the barks arrive at the place where the fish lie, and have cast anchor, each diver binds a stone, six inches thick and a foot long, under his body; which serves him as ballast, prevents his being driven away by the motion of the water, and enables him to walk more steadily under the waves. They also tie another very heavy stone to one foot, by which they are very speedily sent to the bottom of the sea; and as the oysters are usually firmly fastened to

the rocks, they arm their hands with leather mittens, to prevent their being wounded in pulling them violently off; but this task some perform with an iron rake. In the last place, each diver carries down with him a large net in the manner of a sack, tied to his neck by a long cord, the other end of which is fastened to the side of the bark. This net is to hold the oysters gathered from the rock; and the cord is to pull up the diver when his bag is full, or he wants air.

In this equipage he sometimes precipitates himself sixty feet under water; and as he has no time to lose, he no sooner arrives at the bottom, than he begins to run from side to side, tearing up all the oysters he meets with, and cramming them into his budget.

At whatever depth the divers are, the light is so great, that they easily see whatever passes in the sea; and, to their great consternation, sometimes perceive monstrous fishes, from which all their address in muddying the water, &c. will not always save them, but they unhappily become their prey: and of all the dangers of the fishery, this is one of the greatest and most usual. The best divers will keep under water near half an hour, and the rest do not stay less than a quarter. During this time they hold their breath without the use of oils or any other liquors; only acquiring the habit by long practice. When they find themselves straitened, they pull the rope to which the bag is fastened, and hold fast by it with both hands; when those in the bark, taking the signal, heave them up into the air, and unload them of their fish; which is sometimes 500 oysters, and sometimes not above 50. Some of the divers need a moment's respite to recover breath; others jump in again instantly, continuing this violent exercise without intermission for several hours.

On the shore they unload their barks, and lay their oysters in an infinite number of little pits dug in the sand four or five feet square, raising heaps of sand over them to the height of a man; and in this condition they are left till the rain, wind, and sun, have obliged them to open, which soon kills them: upon this the flesh rots and dries, and the pearls, thus disengaged, fall into the pit, on their taking out the shells. After clearing the pits of the grosser filth, they sift the sand several times in order to find the pearl; but, whatever care they take, they always lose a great many. After cleaning and drying the pearls, they are passed through a kind of sieve, according to their sizes; the smallest are then sold as seed-pearls, and the rest put up to auction, and sold to the highest bidder.

Artificial PEARLS. Attempts have been made to take out stains from pearls, and to render the foul opaque-coloured ones equal in lustre to the oriental. Abundance of processes are given for this purpose in books of secrets and travels; but they are very far from answering what is expected from them. Pearls may be cleaned indeed from any external foulness by washing and rubbing them with a little Venice soap and warm water, or with ground rice and salt, with starch and powder-blue, plaster of Paris, coral, white vitriol and tartar, cuttle-bone, pumice-stone, and other similar substances; but a stain that reaches deep into

Pearl
Peat.

into the substance of the pearls is impossible to be taken out. Nor can a number of small pearls be united into a mass similar to an entire natural one, as some pretend.

There are, however, methods of making artificial pearls, in such manner as to be with difficulty distinguished from the best oriental. The ingredient used for this purpose was long kept a secret; but is now discovered to be a fine scale-like substance found upon the under side of the scales of the blay or bleak fish. The scales, taken off in the usual manner, are washed and rubbed with fresh parcels of fair water, and the several liquors suffered to settle: the water being then poured off, the pearly matter remains at the bottom, of the consistence of oil, called by the French *essence d'orient*. A little of this is dropped into a hollow bead of bluish glass, and shaken about so as to line the internal surface; after which the cavity is filled up with wax, to give solidity and weight. Pearls made in this manner are distinguishable from the natural only by their having fewer blemishes.

Mother-of-PEARL is the shell, not of the pearl oyster, but of another sea-fish of the oyster kind. This shell, on the inside, is extremely smooth, and of the whiteness and water of pearl itself: it has also the same lustre on the outside after the external laminae have been taken off by aquafortis and the lapidary's mill. Mother of pearl is used in inlaid works, and in several toys, as snuff-boxes, &c.

PEARSON (John), a very learned English bishop in the 17th century, was born at Snoring in 1613. After his education at Eton and Cambridge, he entered into holy orders in 1639, and was the same year colated to the prebend of Netherhaven in the church of Sarum. In 1640 he was appointed chaplain to the lord keeper Finch, and by him presented to the living of Torrington in Suffolk. In 1650 he was made minister of St Clement's, Eastcheap, in London. In 1657, he and Mr Gunning had a dispute with two Roman Catholics, upon the subject of schism; a very unfair account of which was printed at Paris in 1658. Some time after, he published his *Exposition of the Creed*, and several other works. After various preferments, he was advanced in 1672 to the see of Chester; where he died, in 1686.

PEAT, a kind of turf used for fuel in several countries. See CHEMISTRY, n° 516.

There are very considerable differences in peat, proceeding perhaps wholly from different mineral admixtures; for the substance of the peat is plainly of vegetable origin, whence it is found to answer for the smelting of ores, and the reduction of metallic calces, nearly in the same manner as the coals of wood. Some sorts yield in burning a very disagreeable smell, which extends to a great distance; whilst others are inoffensive. Some burn into grey or white, and others into red ferruginous ashes. The ashes yield, on elixation, a small quantity of alkaline salt, with sometimes one and sometimes another salt of the neutral kind.

The smoke of peat does not preserve or harden flesh like that of wood; and the foot, into which it condenses, is more disposed to liquefy in moist weather. On distilling peat in close vessels, there arises a clear insipid phlegm, an acid liquor, which is succeeded by an alkaline one, and a dark coloured oil. The oil has a

Peat
Pecten.

very pungent taste; and an empyreumatic smell, less fetid than that of animal substances, more so than that of mineral bitumens: it congeals in the cold into a pitchy mass, which liquefies in a small heat: it readily catches fire from a candle, but burns less vehemently than other oils, and immediately goes out upon removing the external flame: it dissolves almost totally in rectified spirit of wine into a dark brownish red liquor.

PEBBLES, the name of a genus of fossils, distinguished from the flints and homöochroa by their having a variety of colours. These are defined to be stones composed of a crystalline matter debased by earths of various kinds in the same species, and then subject to veins, clouds, and other variegations, usually formed by incrustation round a central nucleus, but sometimes the effect of a simple concretion; and veined like the agates, by the disposition which the motion of the fluid they were formed in gave their differently coloured substances.

The variety of pebbles is so great, that an hasty describer would be apt to make almost as many species as he saw specimens. A careful examination will teach us, however, to distinguish them into a certain number of essentially different species, to which all the rest may be referred as accidental varieties. When we find the same colours, or those resulting from a mixture of the same, such as nature frequently makes in a number of stones, we shall easily be able to determine that these are all of them the same species, though of different appearances; and that whether the matter be disposed of in one or two, or in 20 crusts, laid regularly round a nucleus; or thrown irregularly, without a nucleus, into irregular lines; or lastly, if blended into an uniform mass.

These are the three states in which every pebble is found; for if it has been naturally and regularly formed by incrustation round a certain nucleus, we find that always the same in the same species, and the crusts not less regular and certain. If the whole has been more hastily formed, and the result only of one simple concretion, if that has happened while its different substances were all moist and thin, they have blended together and made a mixed mass of the joint colour of them all. But if they have been something harder when this has happened, and too far concreted to diffuse wholly among one another, they are found thrown together into irregular veins. These are the natural differences of all the pebbles; and having regard to these in the several variegations, all the known pebbles may be reduced to 34 species.

PECCANT, in medicine, a term used for those humours of the body which offend either by their quantity or quality.

PECCARY, or TAJACU, in zoology; a species of Suis.

PECK, a measure of capacity, four of which make a bushel.

PECORA, in zoology, the fifth order of the class mammalia, in the Linnean system. See ZOOLOGY.

PECTEN, the SCALLOP; a genus of shell-fish, the characters of which are these: The animal is a tethys; the shell bivalve and unequal; the hinge toothless, having a small ovated hollow. This shell-fish is one of the spinners, having the power of spinning threads like the muscle

Pectoral
||
Peculiar.

muscle: but they are much shorter and coarser than even those of that fish; so that they can never be brought into any kind of work like the longer and finer threads of the pinna marina. The use of the threads which are spun by the scallop is to fix the creature to any solid body near its shell. All these proceed, as in the muscle, from one common trunk. It is an evident proof that the fish has a power of fixing itself at pleasure to any solid body by means of these threads, that after storms the scallops are often found tossed upon rocks, where there were none the day before; and yet these are fixed by their threads, as well as those which had remained ever so long in their place. They form their threads in the very same manner with the muscle; only their organ which serves for spinning is shorter, and has a wider hollow, whence the threads are necessarily thicker and shorter. The most remarkable species of this genus is,

The *maximus*, or great scallop, with 14 rays, very prominent and broad; striated lengthwise above and below. These grow to a large size; are found in beds by themselves; are dredged up, and barrelled for sale. The ancients say that they have a power of removing themselves from place to place by vast springs or leaps. This shell was called by the Greeks *πτερυγ*, by the Latins *petten*; and was used by both as a food. When dressed with pepper and cummin, it was taken medicinally.

The scallop was commonly worn by pilgrims on their hat, or the cape of their coat, as a mark that they had crossed the sea in their way to the Holy Land, or some distant object of devotion.

PECTORAL, an epithet for medicines good in diseases of the breast and lungs.

PECTORALIS, in anatomy. See there, *Table of the Muscles*.

PECULATE, in civil law, the crime of embezzling the public money, by a person intrusted with the receipt, management, or custody thereof. This term is also used by civilians for a theft, whether the thing be public, fiscal, sacred, or religious.

PECULIAR, in the canon law, signifies a particular parish or church that has jurisdiction within itself for granting probates of wills and administrations, exempt from the ordinary or bishop's courts. The king's chapel is a royal peculiar, exempt from all spiritual jurisdiction, and reserved to the visitation and immediate government of the king himself. There is likewise the archbishop's peculiar; for it is an ancient privilege of the see of Canterbury, that wherever any manors or advowsons belong to it, they forthwith become exempt from the ordinary, and are reputed peculiars: there are 57 such peculiars in the see of Canterbury.

Besides these, there are some peculiars belonging to deans, chapters, and prebendaries, which are only exempted from the jurisdiction of the archdeacon: these are derived from the bishop, who may visit them, and to whom there lies an appeal.

PECULIARS (*Court of*), is a branch of, and annexed to, the court of ARCHES. It has a jurisdiction over all those parishes dispersed through the province of Canterbury in the midst of other dioceses, which are exempt from the ordinary's jurisdiction, and subject to the metropolitan only. All ecclesiastical causes, arising within these peculiar or exempt jurisdictions, are originally

cognizable by this court; from which an appeal lay formerly to the pope, but now by the stat. 25 H. VIII. c. 19. to the king in chancery.

PECULIUM, the stock or estate which a person, in the power of another, as a slave, may acquire by his industry.

In the Romish church, peculium denotes the goods which each religious reserves and possesses to himself.

PEDALS, the largest pipes of an organ, so called because played and stopped with the foot. The pedals are made square, and of wood; they are usually 13 in number. They are of modern invention, and serve to carry the sounds of an octave deeper than the rest. See ORGAN.

PEDAGOGUE, or PEDAGOGUE, a tutor or master, to whom is committed the discipline and direction of a scholar, to be instructed in grammar and other arts. The word is formed from the Greek *παιδων αγορα*, *puerorum ductor*, "leader of boys."

M. Fleury observes, that the Greeks gave the name *pedagogus* to slaves appointed to attend their children, lead them, and teach them to walk, &c. The Romans gave the same denomination to the slaves who were intrusted with the care and instruction of their children.

PEDANT, a school-master, or pedagogue, who professes to instruct and govern youth, teach them the humanities, and the arts. See PEDAGOGUE.

PEDANT is also used for a rough, unpolished man of letters, who makes an impertinent use of the sciences, and abounds in unseasonable criticisms and observations.

Dacier defines a pedant, a person who has more reading than good sense. See PEDANTRY.

Pedants are people ever armed with quibbles and syllogisms; breathe nothing but disputation and chancery, and pursue a proposition to the last limits of logic.

Malebranche describes a pedant as a man full of false erudition, who makes a parade of his knowledge, and is ever quoting some Greek or Latin author, or hunting back to a remote etymology.

St Evremont says, that to paint the folly of a pedant, we must represent him as turning all conversation to some one science or subject he is best acquainted withal.

There are pedants of all conditions, and all robes. Wicquefort says, an ambassador, always attentive to formalities and decorums, is nothing else but a political pedant.

PEDANTRY, or PEDANTISM, the quality or manner of a pedant. See PEDANT.

To swell up little and low things, to make a vain show of science, to heap up Greek and Latin without judgment, to tear those to pieces who differ from us about a passage in Suetonius or the etymology of a word, to stir up all the world against a man for not admiring Cicero enough, to be interested for the reputation of an ancient as if he were our next of kin, is what we properly call *pedantry*.

PEDARIAN, in Roman antiquity, those senators who signified their votes by their feet, not their tongues; that is, such as walked over to the side of those whose opinion they approved of, in divisions of the house.

PEDERASTS, the same with SODOMITES.

PEDESTAL, in architecture, the lowest part of an

Peculium
||
Pedestal.

Pedicle, an order of columns, being that part which sustains the column, and serves it as a foot or stand. See **COLUMN**.

Pediculus.

PEDICLE, among botanists, that part of a stalk which immediately sustains the leaf of a flower or a fruit, and is commonly called a *footstalk*.

PEDICULUS, the Louse, in zoology, a genus of insects belonging to the order of aptera. It has six feet, two eyes, and a sort of sting in the mouth; the feelers are as long as the thorax; and the belly is depressed and sublobated.

Many animals both of the quadruped and flying kinds are subject to lice; but these are of peculiar species on each animal, and are not at all like those which infest the human body. Nay, even insects are infested with vermin-which feed on and torment them. Several kinds of beetles are subject to lice; but particularly that kind called thence the *lousy beetle*. The lice on this are very numerous, and will not be shook off. The earwig is often infested with lice, just at the setting on of its head: these are white, and shining like mites, but they are much smaller; they are round-backed, flat belliced, and have long legs, particularly the foremost pair. Snails of all kinds, but especially the large naked sorts, are very subject to lice; which are continually seen running about them, and devouring them. Numbers of little red lice, with a very small head, and in shape resembling a tortoise, are often seen about the legs of spiders, and they never leave the animal while he lives; but if he is killed, they almost instantly forsake him. A sort of whitish lice is found on humble-bees: they are also found upon ants; and fishes are not less subject to them than other animals.

Kircher tells us, that he found lice also on flies, and M. de la Hire has given a curious account of the creature which he found on the common fly. Having occasion to view a living fly with the microscope, he observed on its head, back, and shoulders, a great number of small animals crawling very nimbly about, and often climbing up the hairs which grow at the origin of the fly's legs. He with a fine needle took up one of these, and placed it before the microscope used to view the animalcules in fluids. It had eight legs; four on each side. These were not placed very distant from each other; but the four towards the head were separated by a small space from the four towards the tail. The feet were of a particular structure, being composed of several fingers, as it were, and fitted for taking fast hold of any thing; but the two nearest the head were also more remarkable in this particular than those near the tail; the extremities of the legs for a little way above the feet were dry and void of flesh like the legs of birds, but above this part they appeared plump and fleshy. It had two small horns upon its head, formed of several hairs arranged closely together; and there were some other clusters of hairs by the side of these horns, but they had not the same figure; and towards the origin of the hinder legs there were two other such clusters of hairs which took their origin at the middle of the back. The whole creature was of a bright yellowish red; the legs, and all the body, except a large spot in the centre, were perfectly transparent. In size, he computed it to be about $\frac{1}{1000}$ th part of the head of the fly; and he observes, that such kind of vermin are rarely found on flies.

The louse which infests the human body makes a Pediculus very curious appearance through a microscope. It has such a transparent shell or skin, that we are able to discover more of what passes within its body than in most other living creatures. It has naturally three divisions, the head, the breast, and the tail part. In the head appear two fine black eyes, with a horn that has five joints, and is surrounded with hairs standing before each eye; and from the end of the nose or snout there is a pointed projecting part, which serves as a sheath or case to a piercer or sucker, which the creature thrusts into the skin to draw out the blood and humours which are its destined food; for it has no mouth that opens in the common way. This piercer or sucker is judged to be 700 times smaller than a hair, and is contained in another case within the first, and can be drawn in or thrust out at pleasure. The breast is very beautifully marked in the middle; the skin is transparent, and full of little pits; and from the under part of it proceed six legs, each having five joints, and their skin all the way resembling shagreen, except at the ends where it is smoother. Each leg is terminated by two claws, which are hooked, and are of an unequal length and size. These it uses as we would a thumb and middle finger; and there are hairs between these claws as well as all over the legs. On the back part of the tail there may be discovered some ring-like divisions, and a sort of marks which look like the strokes of a rod on the human skin; the belly looks like shagreen, and towards the lower end it is very clear, and full of pits: at the extremity of the tail there are two semicircular parts all covered over with hairs, which serve to conceal the anus. When the louse moves its legs, the motion of the muscles, which all unite in an oblong dark spot in the middle of the breast, may be distinguished perfectly, and so may the motion of the muscles of the head when it moves its horns. We may likewise see the various ramifications of the veins and arteries, which are white, with the pulse regularly beating in the arteries. But the most surprising of all the sights is the peristaltic motion of the guts, which is continued all the way from the stomach down to the anus.

If one of these creatures, when hungry, be placed on the back of the hand, it will thrust its sucker into the skin, and the blood which it sucks may be seen passing in a fine stream to the fore-part of the head; where, falling into a roundish cavity, it passes again in a fine stream to another circular receptacle in the middle of the head; from thence it runs thro' a small vessel to the breast, and then to a gut which reaches to the hinder part of the body, where in a curve it turns again a little upward; in the breast and gut the blood is moved without intermission, with a great force; especially in the gut, where it occasions such a contraction of the gut as is very surprising. In the upper part of the crooked ascending gut above-mentioned, the propelled blood stands still, and seems to undergo a separation, some of it becoming clear and watery, while other black particles are pushed forward to the anus. If a louse is placed on its back, two bloody darkish spots appear; the larger in the middle of the body, the lesser towards the tail; the motions of which are followed by the pulsation of the dark bloody spot, in or over which the white bladder

Pedicules. seems to lie. This motion of the systole and diastole is best seen when the creature begins to grow weak; and on pricking the white bladder, which seems to be the heart, the creature instantly dies. The lower dark spot is supposed to be the excrement in the gut.

Lice have been supposed to be hermaphrodites; but this is erroneous; for Mr Liewenhoeck observed, that the males have stings in their tails, which the females have not. And he supposes the smarting pain, which those creatures sometimes give, to be owing to their stinging with these stings when made uneasy by pressure or otherwise. He says, that he felt little or no pain from their suckers, though six of them were feeding on his hand at once.

In order to know the true history and manner of breeding of these creatures, Mr Liewenhoeck put two female lice into a black stocking, which he wore night and day. He found on examination that, in six days one of them had laid above 50 eggs; and, upon dissecting it, he found as many yet remaining in the ovary: whence he concludes, that in 12 days it would have laid 100 eggs. These eggs naturally hatch in six days, and would then probably have produced 50 males, and as many females; and these females coming to their full growth in 18 days, might each of them be supposed after 12 days more to lay 100 eggs; which eggs, in six days more, might produce a young brood of 5000; so that in eight weeks, one louse may see 5000 of its own descendants.

Signior Rhedi, who has more attentively observed these animals than any other author, has given several engravings of the different species of lice found on different animals. Men, he observes, are subject to two kinds; the common louse, and the crab-louse. He observes also, that the size of the lice is not at all proportioned to that of the animal which they infest; since the starling has them as large as the swan.

Some kinds of constitutions are more apt to breed lice than others; and in some places of different degrees of heat, they are certain to be destroyed upon people who in other climates are over-run with them. It is an observation of Oviedo, that the Spanish sailors, who are generally much afflicted with lice, always lose them in a certain degree of latitude in their voyage to the East Indies, and have them again on their returning to the same degree. This is not only true of the Spaniards, but of all other people who make the same voyage; for though they set out ever so lousy, they have not one of those creatures by the time they come to the tropic. And in the Indies there is no such thing as a louse about the body, though the people be ever so filthy. The sailors continue free from these creatures till their return; but in going back, they usually begin to be lousy after they arrive at the latitude of the Madeira islands. The extreme sweats, which the working people naturally fall into, between the latitude of Madeira and the Indies, drown and destroy the lice; and have the same effect as the rubbing over the lousy heads of children with butter and oil. The sweat, in these hot climates, is not rank as in Europe, and therefore it is not apt to breed lice; but where people return into latitudes where they sweat rank again, their nastiness subjects them to the same visitations of these vermin as before. The people in general in the Indies are very subject to lice in their

heads, tho' free from them on their bodies. The reason of this is, that their heads sweat less than their bodies, and they take no care to comb and clean them. The Spanish negroes wash their heads thoroughly once every week with soap, to prevent their being lousy. The makes them escape much better than the other negroes who are slaves there; for the lice grow so numerous in their heads, that they often eat large holes in them.

PEDILUVIUM, or BATHING of the FEET. The uses of warm bathing in general, and of the pediluvium in particular, are so little understood, that they are often preposterously used, and sometimes as injudiciously obtained from.

In the Edinburgh medical essays, we find an ingenious author's opinion of the warm pediluvium, notwithstanding that of Borelli, Boerhaave, and Hoffman, to the contrary, to be, That, the legs becoming warmer than before, the blood in them is warmed: this blood rarifying, distends the vessels; and in circulating imparts a great degree of warmth to the rest of the mass; and as there is a portion of it constantly passing through the legs, and acquiring new heat there, which heat is in the course of circulation communicated to the rest of the blood, the whole mass rarifying, occupies a larger space, and of consequence circulates with greater force. The volume of the blood being thus increased, every vessel is distended, and every part of the body feels the effects of it; the distant parts a little later than those first heated. The benefit obtained by a warm pediluvium is generally attributed to its making a derivation into the parts immersed, and a revulsion from those affected, because they are relieved; but the cure is performed by the direct contrary method of operating, viz. by a greater force of circulation through the parts affected, removing what was stagnant or moving too sluggishly there. Warm bathing is of no service where there is an irresolvable obstruction, though, by its taking off from a spasm in general, it may seem to give a moment's ease: nor does it draw from the distant parts, but often hurts by pushing against matter that will not yield with a stronger impetus of circulation than the stretched and diseased vessels can bear: so that where there is any suspicion of scirrhus, warm bathing of any sort should never be used. On the other hand, where obstructions are not of long standing, and the impacted matter is not obstinate, warm baths may be of great use to resolve them quickly. In recent colds, with slight humoral peripneumonies, they are frequently an immediate cure. This they effect by increasing the force of the circulation, opening the skin, and driving freely through the lungs that lentor which stagnated or moved slowly in them. As thus conducing to the resolution of obstructions, they may be considered as short and safe fevers; and in using them we imitate nature, which by a fever often carries off an obstructing cause of a chronic ailment. Borelli, Boerhaave, and Hoffman, are all of opinion, that the warm pediluvium acts by deriving a larger quantity of blood into the parts immersed. But arguments must give way to facts: the experiments related in the Medical Essays seem to prove to a demonstration, that the warm pediluvium acts by rarifying the blood.

A warm pediluvium, when rightly tempered, may be used.

used as a safe cordial, by which circulation can be roused, or a gentle fever raised; with this advantage over the cordials and sudorifics, that the effect of them may be taken off at pleasure.

Pediluvia are sometimes used in the small-pox; but Dr Stevenson thinks their frequent tumultuous operations render that suspected, and at best of very doubtful effect; and he therefore prefers Mons. Martin of Lausanne's method of bathing the skin, not only of the legs, but of the whole body, with a soft cloth dipped in warm water, every four hours, till the eruption; by which means the pustules may become universally higher, and consequently more safe.

PEDIMENT. See ARCHITECTURE, n° 77.

PEDLAR, a travelling foot-trader. See HAWKER.

Among the British and French the pedlars are despised; but it is otherwise in certain countries. In Spanish America, the business is so profitable, that it is thought by no means dishonourable; and there are many gentlemen in Old Spain, who, when their circumstances are declining, send their sons to the Indies to retrieve their fortunes in this way. Almost all the commodities of Europe are distributed through the southern continent of America by means of these pedlars. They come from Panama to Paita by sea; and in the road from the port last mentioned, they make Peura their first voyage to Lima. Some take the road through Caxamalilla; others through Truxillo, along shore from Lima. They take their passage back to Panama by sea, and perhaps take with them a little cargo of brandy. At Panama they again stock themselves with European goods, returning by sea to Paita, where they are put on shore; there they hire mules and load them, the Indians going with them in order to lead them back. Their travelling expenses are next to nothing; for the Indians are brought under such subjection, that they find lodging for them, and provender for their mules, frequently thinking it an honour done them for their guests to accept of this for nothing, unless the stranger now and then, out of generosity or compassion, makes a small recompence.

In Poland, where there are few or no manufactures, almost all the merchandize is carried on by pedlars, who are said to be generally Scotsmen, and who, in the reign of king Charles II. are said to have amounted to no fewer than 53,000.

PEDUNCLE, in botany. See PEDICLE.

PEEBLES, or TWEEDALE, a county of Scotland, extending 25 miles in length, and 18 in breadth. It is bounded on the east by Etrick Forest, on the south by Annandale, on the west by Clydesdale, and on the north by Mid Lothian. Tweedale is a hilly country, well watered with the Tweed, the Yarrow, and a great number of smaller streams that fertilize the valleys, which produce good harvests of oats and barley, with some proportion of wheat. All the rivers of any consequence abound with trout and salmon. The lake called *West-Water Loch* swarms with a prodigious number of eels. In the month of August, when the west wind blows, they tumble into the river Yarrow in such shoals, that the people who wade in to catch them run the risk of being overturned. There is another lake on the borders of Annandale, called *Loch-*

gennen, which forms a cataract over a precipice 250 paces high: here the water falls with such a momentum as to kill the fish underneath. About the middle of this country is the hill or mountain of Braidalb, from the top of which the sea may be seen on each side of the island. Tweedale abounds with limestone and freestone. The hills are generally as green as the downs in Sussex, and feed innumerable flocks of sheep, that yield great quantities of excellent wool. The country is well shaded with woods and plantations, abounds with all the necessaries of life, and is adorned with many fine seats and populous villages. The earls of March were hereditary sheriffs of Tweedale, which bestows the title of *marquis* on a branch of the ancient house of Hay, earls of Errol, and hereditary high constables of Scotland. The family of Tweedale is, by the female side, descended from the famous Simon de Frazer, proprietor of great part of this country, who had a great share in obtaining the triple victory at Rosslyn. The chief, and indeed the only town of consequence in Tweedale, is PEEBLES, a small inconsiderable royal borough, and seat of a presbytery, pleasantly situated on the banks of the Tweed, over which there is at this place a stately stone bridge of five arches. In the neighbourhood of Peebles, near the village of Romana, on the river Lene, we see the vestiges of two Roman castella, or stationary forts; and a great many terraces on the neighbouring hills, which perhaps have served as itinerary encampments. In the shire of Tweedale there are many ancient and honourable families of the gentry. Among these, Douglas of Cavers, who was hereditary sheriff of the county, still preserves the standard and the iron mace of the gallant lord Douglas, who fell in the battle of Otterburn, just as his troops had defeated and taken Henry Percy, surnamed *Hotspur*. In the churchyard of Drumelzier, belonging to an ancient branch of the Hay-family, the famous Merlin is supposed to lie buried. There was an old traditional prophecy, that the two kingdoms should be united, when the waters of the Tweed and the Panefel should meet at his grave. Accordingly, the country people observe that this meeting happened in consequence of an inundation at the accession of James VI. to the crown of England.

PEEK, in the sea-language, is a word used in various senses. Thus the anchor is said to be a-peek, when the ship being about to weigh comes over her anchor in such a manner that the cable hangs perpendicularly between the haufe and the anchor.

To have a-peek is to bring the peek so as that the anchor may hang a-peek. A ship is said to ride a-peek, when lying with her main and fore yards hoisted up, one end of her yards is brought down to the shrouds, and the other raised up an end; which is chiefly done when the lies in rivers, lest other ships falling foul of the yards should break them. Riding a-broad peek, denotes much the same, excepting that the yards are only raised to half the height.

Peek is also used for a room in the hold, extending from the bitts forward to the stem: in this room men of war keep their powder, and merchant-men their victuals.

PEER, in general, signifies an equal, or one of the same rank and station: hence in the acts of some councils,

Peer. cils, we find these words; *with the consent of our peers, bishops, abbots, &c.* Afterwards the same term was applied to the vassals or tenants of the same lord, who were called *peers*, because they were all equal in condition, and obliged to serve and attend him in his courts; and *peers in fiefs*, because they all held fiefs of the same lord.

The term *peers* is now applied to those who are impanelled in an inquest upon a person for convicting or acquitting him of any offence laid to his charge; and the reason why the jury is so called, is because by the common law and the custom of this kingdom, every person is to be tried by his peers or equals; a lord by the lords, and a commoner by commoners. See the article **JURY**.

PEER of the Realm, a noble lord who has a seat and vote in the House of Lords, which is also called the *House of Peers*.

These lords are called *peers*, because though there is a distinction of degrees in our nobility, yet in public actions they are equal, as in their votes in parliament, and in trying any nobleman or other person impeached by the commons, &c. See **PARLIAMENT**.

House of PEERS, or *House of Lords*, forms one of the three estates of parliament. See **LORDS and PARLIAMENT**.

In a judicative capacity, the house of peers is the supreme court of the kingdom, having at present no original jurisdiction over causes, but only upon appeals and writs of error; to rectify any injustice or mistake of the law committed by the courts below. To this authority they succeeded of course upon the dissolution of the *Aula Regia*. For as the barons of parliament were constituent members of that court, and the rest of its jurisdiction was dealt out to other tribunals, over which the great officers who accompanied those barons were respectively delegated to preside, it followed, that the right of receiving appeals, and superintending all other jurisdictions, still remained in that noble assembly, from which every other great court was derived. They are therefore in all cases the last resort, from whose judgment no farther appeal is permitted; but every subordinate tribunal must conform to their determinations: The law reposing an entire confidence in the honour and conscience of the noble persons who compose this important assembly, that they will make themselves masters of those questions upon which they undertake to decide; since upon their decision all property must finally depend. See **LORDS**.

PEERS of France, are twelve great lords of that kingdom; of which six are dukes and six counts; and of these, six are ecclesiastics and six laymen: thus the archbishop of Rheims, and the bishop of Laon and Langres, are dukes and peers; and the bishops of Chalons, the Marn, Noyons, and Beauvais, are counts and peers. The dukes of Burgundy, Normandy, and Aquitaine, are lay peers and dukes; and the counts of Flanders, Champagne, and Toulouse, lay peers and counts. These peers still assist at the coronation of kings, either in person or by their representatives, who each performs the functions attached to his respective dignity: but as the six lay peerages are all at present united to the crown, except that of the count of Flanders, six lords of the first quality are chosen to represent them: but the eccle-

siastical peers usually assist in person. At present the title of peer is bestowed on every lord whose estate is erected into a peerage; the number of which is uncertain, as it depends entirely on the king.

PEERESS, a woman who is noble by descent, creation, or marriage.

If a peeress, by descent or creation, marries a person under the degree of nobility, she still continues noble: but if she obtains that dignity only by marriage, she loses it, on her afterwards marrying a commoner; yet by the courtesy of England, she always retains the title of her nobility.

PEWIT, in ornithology. See **LARUS**.

PEGASUS, among the poets, a horse imagined to have wings; being that whereon Bellerophon was fabled to be mounted when he engaged the chimera. See **CHIMERA**.

The opening of the fountain Hippocrene on mount Helicon, is ascribed to a blow of Pegasus's hoof. It was feigned to have flown away to heaven, where it became a constellation. Hence

Pegasus, in astronomy, the name of a constellation of the northern hemisphere, in form of a flying horse. See **ASTRONOMY**, n^o 206.

PEGU, a very considerable kingdom of Asia, beyond the Ganges. The country properly so called is but about 350 miles in length from north to south, and as much in breadth from east to west. It is bounded, on the north by the kingdoms of Arrakan and Ava; on the east, by the Upper and Lower Siam; on the south, by part of Siam and the sea; and on the west, by the sea and part of Arrakan. Considered in a larger sense however, as augmented by the conquests of its Barma kings, it extends as far north as the province of Yunnan in China, comprehending almost all the farther peninsula of India.

The kingdom of Pegu is said to have been founded about 1100 years ago. Its first king was a seaman; concerning whom and his successors we know nothing till the discovery of the East Indies by the Portuguese in the beginning of the 16th century. In 1518 the throne of Pegu was possessed by one Bressagukan, with whom Antony Correa the Portuguese ambassador solemnly concluded a peace in 1519. This monarch was possessed of a very large and rich empire, nine kingdoms being in subjection to him, whose revenues amounted to three millions of gold. We hear no farther account of his transactions after the conclusion of the treaty with the Portuguese. In 1539 he was murdered on the following occasion: Among other princes who were his tributaries was Para Mandara, king of the Barmas. These people inhabited the high lands called *Pangavirau*, to the northward of the kingdom of Pegu. Their prince, by one of the terms of his vassalage, was obliged to furnish the king of Pegu with 30,000 Barmas, to labour in his mines and other public works. As the king used frequently to go and see how his works went forward, and in these journeys took along with him none but his women, the Barmas observing these visits frequently repeated, formed a design of robbing the queen and all the concubines of their jewels; and pursuant to this design, the next time the king visited the works, they murdered him, and having stripped the ladies fled to their own country.

Peeress

Pegu.

By this enormity all Pegu was thrown into confusion : but, instead of revenging the death of their king, the people divided every where into factions ; so that Dacha Rupi, the lawful heir to the crown, found himself unable to maintain his authority. Of these commotions, the king of the Barmas taking the advantage, not only shook off the yoke, but formed a design of conquering the kingdom of Pegu itself. With this view he invaded the country with an army of more than a million of foot, and 5000 elephants ; besides a great fleet which he sent down the river Ava towards Bagou, or Pegu, the capital of the empire ; while he himself marched thither by land. Just at this time Ferdinand de Mirales arrived at Pegu from Goa with a large galleon richly laden on account of the king of Portugal. As soon as Dacha Rupi heard of his coming, he sent to desire his assistance against the enemy. This he obtained by great presents and promises : and Mirales, setting out in a galliot, joined the king's ships. Had the numbers been any thing near an equality, the superior skill of Mirales would undoubtedly have gained the victory : But the fleet of the Barmas covered the whole river though as large as the Ganges, while that of Dacha Rupi could scarce be observed in comparison with them. Mirales did every thing that man could do, and even held out alone after the natives had deserted him ; but at last, oppressed and overwhelmed with numbers, he was killed, with all his men.

Thus Para Mandara became master of all Pegu ; after which he attacked the tributary kingdoms. In 1544 he besieged Martavan, the capital of a kingdom of the same name, then very great and flourishing. The land-forces which he brought against it consisted of 700,000 men, while by sea he attacked it with a fleet of 1700 sail ; 100 of which were large galleys, and in them 700 Portuguese commanded by John Cayero, who had the reputation of being a valiant and experienced officer. The siege, however, continued seven months, during which time the Barmas lost 120,000 men ; but at last the besieged king, finding himself straitened for want of provisions, and unable to withstand so great a power, offered terms of capitulation. The besiegers would admit of no terms, upon which the distressed king applied to the Portuguese in the service of his enemy ; for by their assistance he doubted not to be able to drive away the Barmas. Accordingly he sent one Seixas to Cayero, intreating him to receive himself, his family, and treasure, on board the four ships he had under his command ; offering, on that condition, to give half his riches to the king of Portugal, to become his vassal, and pay such tribute as should be agreed upon. Cayero consulted the principal officers, and in their presence asked Seixas what he thought the treasure might amount to. Seixas answered, that out of what he had seen, for he had not seen all, two ships might be loaded with gold, and four or five with silver. This proposal was too advantageous to be slighted ; but the rest of the officers envying the great fortune which Cayero would make, threatened to discover the whole to the king of Barma if he did not reject it. The unhappy king of Martavan had now no other resource but to set fire to the city, make a folly, and die honourably with the few men he had with him : but

even here he was disappointed ; for by the desertion of 4000 of his troops the enemy were apprised of his design, and prevented it. Thus betrayed, he capitulated with the Barma king for his own life and the lives of his wife and children, with leave to end his days in retirement. All this was readily granted, but the conqueror intended to perform no part of his promise. The city was plundered and burnt, by which above 60,000 persons perished, while at least an equal number were carried into slavery. Six thousand cannon were found in the place ; 100,000 quintals of pepper, and an equal quantity of other spices. The day after this destruction, 21 gibbets were erected on an hill adjoining to the city ; on which the queen, her children and ladies, were executed, by hanging them up alive by the feet : however, the queen expired with anguish before she suffered such a cruel indignity. The king, with 50 of his chief lords, was cast into the sea, with stones about their necks. This monstrous cruelty so provoked the tyrant's soldiers, that they mutined, and he was in no small danger of suffering for it : however, he found means to pacify them ; after which he proceeded to besiege Prom, the capital of another kingdom. Here he increased his army to 900,000 men. The queen by whom it was governed offered to submit to be his vassal ; but nothing would satisfy the Barma monarch less than her surrender at discretion, and putting all her treasure into his hands. This she, who knew his perfidy, refused to do ; on which the city was fiercely assaulted, but greatly to the disadvantage of the Barmas, who lost near 100,000 men. However, the city was at last betrayed to him, when Mandara behaved with his usual cruelty. Two thousand children were slain, and their bodies cut in pieces and thrown to the elephants ; the queen was stripped naked, publicly whipped, and then tortured till she died ; the young king was tied to her dead body, and both together cast into a river, as were also 300 other people of quality.

While the tyrant was employed in fortifying the city, he was informed, that the prince of Ava had failed down the river Queytor with 400 rowing vessels having 30,000 soldiers on board ; but that, hearing of the queen's disaster, he stopped at Meletay a strong fortress about 12 leagues north of Prom, where he waited to be joined by his father the king of Ava with 80,000 men. On this news the Barma king sent his foster-brother Chaumigrem along the river-side with 200,000 men, while he himself followed with 100,000 more. The prince in this emergency burnt his barks, forming a vanguard of the mariners ; and, putting his small army in the best position he could, expected the enemy. A most desperate engagement ensued, in which only 800 of the prince's army were left, and 115,000 out of 200,000 Barmas who opposed him were killed. The 800 Avaus retired into the fort : but Mandara coming up soon after, and being enraged at the terrible havoc made in his army, attacked the fortress most violently for seven days ; at the end of which time, the 800, finding themselves unable to hold out any longer, rushed out in a dark and rainy night, in order to sell their lives at as dear a rate as possible. This last effort was so extremely violent, that they broke through the enemy's troops in several places, and even pressed so hard on the king himself that he was forced to jump
into

Pegu. into the river. However, they were at last all cut off, but not before they had destroyed 12,000 of their enemies.

Mandara having thus become master of the fort, commanded it to be immediately repaired; and failed up the river to the port of Ava, about a league from the capital, where he burnt between 2000 and 3000 vessels, and lost in the interprise about 8000 men. The city itself he did not think proper to invest, as it had been newly fortified, was defended by a numerous garrison, and an army of 80,000 men was advancing to its relief. The king also, apprehensive of Mandara's power, had implored the protection of the emperor Siam; offering to become his tributary on condition that he would assist him with his forces in recovering the city of Prom. To this the emperor readily assented; which news greatly alarmed the Barma monarch, so that he dispatched ambassadors to the Kalaminiham or sovereign of a large territory adjacent, requesting him to divert the emperor from his purpose. On the ambassadors return from this court it appeared that the treaty had already taken effect; but as the season was not yet arrived for invading Ava, Chaumigren the king's foster-brother was sent with 150,000 men to reduce Sebadi or Savadi the capital of a small kingdom about 130 leagues north-east from Pagu. The general, however, failed in his attempt; and afterwards endeavouring to revenge himself on a town in the neighbourhood, he was surprized by the enemy and put to flight.

In the mean time the empire of Siam fell into great distractions; the king together with the heir to the crown were murdered by the queen, who had fallen in love with an officer, whom she married after her husband's death. However, both of them were soon after killed at an entertainment; and the crown was given to a natural brother of the late king, but a coward and a tyrant. On this Mandara resolved to invade the country; and, his principal courtiers concurring in the scheme, he collected an army of 800,000 men, with no fewer than 20,000 elephants. In this army were 1000 Portuguese, commanded by one James Suarez, who already had a pension of 200,000 ducats a-year from the king of Pegu, with the title of his brother, and governor of the kingdom. With this formidable army he set out in April 1548. His first achievement was the taking of a fortress on the borders of the enemy's country; before which, being several times repulsed, and having lost 3000 of his men, he revenged himself by putting all the women to the sword. He next besieged the capital of itself; but though the siege was continued for five months, during which time the most violent attacks were made upon it, the assailants were constantly repulsed with great loss. However, it was still resolved to continue the siege; and a mound of earth was raised, on which were placed 40 pieces of cannon ready to batter it anew, when, in October, advice was received of a rebellion having broke out in Pegu.

The person who headed the rebels on the present occasion was Shoripam Shay, near akin to the former monarch slain twelve years before. He was a religious person, of great understanding, and esteemed a saint. As he was a famous preacher, he made a sermon, in which he set forth the tyranny of the Barmas in such a manner, that he was immediately taken out

of the pulpit and proclaimed king by the people, who, as a token of sovereignty, gave him the title of *Shemindoo*. The first act of sovereignty which he exerted was to cut in pieces 15,000 Barmas, and seize on the treasure: and so agreeable was this change of government to all ranks of people, that in three weeks time all the strong-holds of Pegu fell into his hands.

On this news the king immediately raised the siege in which he was engaged, and in 17 days got to Martavan. Here he was informed, that Shemindoo had posted 500,000 men in different places, in order to intercept his passage; at the same time that he had the mortification to find 50,000 of his best troops deserted. To prevent a greater desertion, after 14 days stay, he departed from Martavan, and soon met Shemindoo at the head of 600,000 men. A desperate engagement followed; in which Shemindoo was entirely defeated, with the loss of 300,000 men. Of the Barma troops were slain 60,000; among whom were 280 Portuguese.

The morning after this victory, the tyrant marched to the city; the inhabitants of which surrendered, on condition of having their lives and effects spared. The kingdom being thus again brought under his subjection, his next step was to punish the principal persons concerned in the rebellion: their heads he cut off; and confiscated their estates, which amounted to no less than ten millions of gold. Others say, that he put all without distinction to the sword, excepting only 12,000, who took shelter in James Suarez's house; that alone affording an asylum from the general slaughter. The plunder was incredible, Suarez alone getting three millions. All these cruelties, however, were insufficient to secure the allegiance of the tyrant's subjects: for in less than three months news was brought that the city of Martavan had revolted; and that the governor had not only declared for Shemindoo, but murdered 2000 Barmas. Mandara then summoned all the lords of the kingdom to meet him with their force, within 15 days, at a place called *Mouchau*, not far from his capital, whither he himself went with 300 men, to wait their arrival. But in the mean time he received intelligence that the shemin or governor of Zatan, a city of some consequence, had submitted to Shemindoo, and also lent him a large sum of gold. The shemin was immediately sent for in order to be put to death: but he, suspecting Mandara's design, excused himself by pretending sickness; after which, having consulted with his friends, he drew together about 600 men; and having with these privately advanced to the place where the king was, he killed him, with the few attendants that were about him at the time. The guards in the court being alarmed with the noise, a skirmish ensued with the shemin's men, in which about 800 were slain on both sides, most of them Barmas. The shemin then retreated to a place called *Pontel*; whither the people of the country, hearing of the death of the king, who was universally hated, resorted to him. When he had assembled about 5000 men, he returned to seek the troops which the late king had with him; and finding them dispersed in several places, easily killed them all. With the Barmas were slain 80 out of 300 Portuguese. The remainder surrendered, with Suarez their leader; and were spared, on condition of their remaining

Pegu. remaining in the service of the shemin.

The shemin now finding his forces daily increase, assumed the title of king; and, to render himself the more popular, gave out, that he would exterminate the Barmas so effectually, as not to leave one in all the kingdom. It happened, however, that one of those who were with the late king at the time he was murdered, escaped the general slaughter; and, swimming over the river, informed Chaumigrem of the king's death. He had with him 180,000 men, all of them natives of Pegu, excepting 30,000 Barmas. He knew very well, that if the natives had known that the king was dead, he and all his Barmas would have instantly been put to the sword. Pretending therefore that he had received orders to put garrisons into several places, Chaumigrem dispatched all the natives into different parts; and thus got rid of those whom he had so much cause to fear. As soon as they were marched, he turned back upon the capital, and seized the king's treasure, together with all the arms and ammunition. He then set fire to the magazines, arsenals, palace, some of whose apartments were ciled with gold, and 2000 rowing vessels which were on the river. Then, destroying all the artillery, he fled with the 30,000 Barmas to his own country, being pursued in vain by the natives of Pegu.

Thus the shemin of Zatan was left in quiet possession of the kingdom; but, by his repeated acts of tyranny and cruelty, he so disgusted his subjects, that many fled to foreign countries, while others went over to Shemindoo, who began now to gather strength again. In the mean time, James Suarez, the Portuguese whom we have often mentioned, lost his life by attempting to ravish a young woman of distinction; the shemin being unable to protect him, and obliged to give him up to the mob, who stoned him to death. The shemin himself did not long survive him; for, being grown intolerable by his oppressions, most of his followers abandoned him, and he was besieged in his capital by Shemindoo with an army of 200,000 men, and soon after slain in a sally: so that Shemindoo now seemed to be fully established in the throne. But in the mean time Chaumigrem, the foster-brother to the deceased king, hearing that Pegu was very ill provided with the means of defence, invaded the kingdom with an army of 300,000 men. Shemindoo met him with three times their number; but his men, being all natives of Pegu, were inferior in strength, notwithstanding their numbers, to the enemy. The consequence was, that Shemindoo was defeated with prodigious slaughter, and Chaumigrem caused himself to be proclaimed king of Pegu. Shortly after, Shemindoo himself was taken; and, after being treated with the utmost of cruelty, was beheaded.

The history of Chaumigrem is very imperfect. However, we know that he was a very great conqueror, and not at all inferior in cruelty to his predecessors. He reduced the empire of Siam and Arrakan, and died in 1583; being succeeded by his son named *Pranjinoko*, then about 50 years of age. When this prince ascended the throne, the kingdom of Pegu was in its greatest height of grandeur; but by his tyranny and obduracy he lost all that his father had gained. He died in 1599, and after his death the kingdom of Pegu became subject to Arrakan; nor have we any farther distinct hi-

story of it.

The air of Pegu is very healthy, and presently recovers sick strangers. The soil also is very rich and fertile in corn, rice, fruit, and roots; being enriched by the inundations of the river Pegu, which are almost incredible, extending above 30 leagues beyond its channel. It produces also good timber of several kinds. The country abounds with elephants, buffaloes, goats, hogs, and other animals, particularly game; and deer is so plenty in September and October, that one may be bought for three or four pence: they are very fleshy, but have no fat. There is store of good poultry; the cocks are vastly large, and the hens very beautiful. As for fish, there are many sorts, and well tasted. In Pegu are found mines, not only of gold, iron, tin, and lead, or rather a kind of copper, or mixture of copper and lead, but also of rubies, diamonds, and sapphires. The rubies are the best in the world; but the diamonds are small, and only found in the claws of poultry and pheasants. Besides, only one family has the privilege of selling them; and none dare open the ground to dig for them. The rubies are found in a mountain in the province of Kaban, or Kapelan, between the city of Pegu and the port of Sirian.

The inhabitants are of an olive, or rather a tawny complexion. The women are branded by some travellers, as having shook off all modesty, on account of their exposing some parts of their bodies which ought to be concealed from sight. Some also tell us, that the men wear bells, which at a certain age, viz. 25 or 30, or, according to others, when they are capable of making use of women, are inserted on each side the virile member between the skin and the flesh, which is opened for that purpose, and healed in seven or eight days. The Peguers may be ranked among the most superstitious of all mankind. They maintain and worship crocodiles; and will drink nothing but the waters of the ditches where those monstrous animals harbour. By thus exposing themselves to the manifest hazard of their lives, they have frequently the misfortune to be devoured. They have five principal festivals in the year, called *Japans*, which they celebrate with extraordinary magnificence. In one of them the king and queen make a pilgrimage about 12 leagues from the city, riding on a triumphal car, so richly adorned with jewels, that it may be said without an hyperbole, that they carry about with them the value of a kingdom. This prince is extremely rich; and has in the chapel of his palace, idols of incalculable value, some of them being of massy gold and silver, and adorned with all sorts of precious stones. The talapins, or priests of this country, have no possessions; but such is the respect paid them by the people, that they are never known to want. They preach to them every Monday, not to commit murder; to take from no person any thing belonging to him; to do no hurt; to give no offence; to avoid impurity and superstition; but above all, not to worship the devil: but these discourses have no effect in the last respect. The people, attached to manicheism, believe, that all good comes from God, that the devil is the author of all the evil that happens to men; and that therefore they ought to worship him, that he may not afflict them. This is a common notion among the Indian idolaters.

The inhabitants of Pegu are accused by some authors with

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with being slovenly in their houses, and nasty in their diet, on account of their seasoning their victuals with fido, a composition made of stinking fish, reduced to a consistency like mustard, so nauseous and offensive, that none but themselves can endure the smell of it. Balbi says, he could sooner bear the scent of stinking carrion; and yet with this they season their rice, and other soups, instead of oil or butter. As they have no wheat in this country, their bread is rice made into cakes. Their common drink is water, or a liquor distilled from coccat-nut water.

The men here, as in most eastern countries, buy their wives, or pay their parents a dowry for them. They have an odd custom; which is to offer their daughters to strangers, and hire them out for a time: some say they hire out their wives in the same manner. These marriages for a term are well regulated, and often prove very beneficial to the occasional husband. Most of the foreigners who trade hither, marry a wife for the time of their stay. In case of a separation, the father is obliged to take care of the boys, and the mother of the girls. We are told that no woman is looked upon the worse, but rather the better, for having had several European husbands: nay, we are told, that no person of fashion in Pegu, from the gentleman to the king, will marry a maiden, till some acquaintance or stranger has had the first night's lodging with her.

In Pegu, the inheritance of all land is in the king: he is likewise the heir of all his subjects who die without issue; but in case they have children, two-thirds go to them, and the rest to his majesty.

When a person falls sick, we are told that they generally make a vow to the devil, from whom they believe all evil comes. Then a scaffold is built, and victuals are spread on the top of it to solace Old Nic, and render him propitious. This feast is accompanied with lighted candles and music; and the whole is managed by an undertaker called the *devil's father*.

The commodities exported from this country are gold, silver, rubies, musk, benjamin, long-pepper, tin, lead, copper; lakka, or gum-lac, whereof they make hard wax; rice; rice-wine; and some sugar-canes, of which they would have plenty, but that the elephants eat them. It may be observed, that under the name of *rubies*, the Peguers comprise topazes, sapphires, amethysts, and other stones; which they distinguish by saying the blue, the violet, and the yellow rubies. The true ruby is red, transparent, or sparkling, inclining near the surface, to the violet of the amethyst. Cotton cloths from Bengal and Coromandel, with some striped silks, are best for the Pegu market, and silver of any sort will go off there; for the king, in return for his eight and a half *per cent.* duty on it, allows the merchants to melt it down, and put what copper alloy they please in it. They wear none of our European commodities in Pegu but hats and ribbons. The gentry will give extravagant prices for fine beaver hats, which they wear without any coats. They are no less fond of ribbons flowered with gold and silver, which they wear round their hats.

As to the religion of the Peguers, it is the same at bottom with that which prevails over the rest of India and Tibet; only varies in dress somewhat in different countries, according to the humour or interest of the priests. They hold the existence of one supreme God,

of whom they make no image; but they have many inferior created gods, whose images are set up in the temples for the laity to worship. Not content with these, we are told they worship the devil also. Many are seen to run about the streets every morning, with rice in one hand and a torch in the other, crying aloud, that they are going to give the devil his breakfast, that he may not hurt them all the day. Besides the manichean doctrine of two principles, one the author of good, and the other of evil, from whence their worshipping the devil has its rise, they believe an eternal succession of worlds without creation. The Peguers hold the doctrine of the Metempsychosis, or transmigration of the human soul, which, after passing through the bodies of various animals, shall attain to the perfection and felicity of their gods; which in effect is no other than a state of annihilation. They have a strong opinion of the sanctity of apes and crocodiles, inasmuch that they believe the persons to be perfectly happy that are devoured by them. Their temples are of a conic form, and some of them a quarter of a mile round. They observe a great many festivals, some of which are called *Japan*. The images of their inferior gods are in a sitting posture, with their legs across, and toes of equal length: their arms and hands very small in proportion to their bodies; their faces longer than human; their ears long, and the lapets very thick. The congregation bow to them when they come in and when they go out; and that is all the worship which they pay to them. The priests of Pegu, called *talapoints*, are a sort of mediant friars. They observe celibacy; and eat but once a-day; living in the woods, in a sort of nests or cages built on the tops of trees for fear of the tigers. They preach frequently, lead very innocent lives, and are very hospitable and humane.

The king of Pegu's revenues arise chiefly from the rent of lands, of which he is the sole proprietor. Another branch of it are the duties paid for the commodities imported or exported. In a word, he is judged the richest monarch in the world, next to the emperor of China.

PEINE FORT ET DURE, (Lat. *poena fortis et dura*), signifies a special punishment inflicted on those who, being arraigned of felony, refuse to put themselves on the ordinary trial, but stubbornly stand mute; it is vulgarly called *pressing to death*. See ARRANGMENT.

PEIRCE (James), an eminent dissenting minister, was born at Wapping, in London, in the year 1674, and was educated at Utrecht and Leyden; after which he spent some time at Oxford, in order to enjoy the benefit of frequenting the Bodleian library. He then for two years preached the Sunday-evening's lecture at the meeting-house in Miles-Lane, London, and then settled at Cambridge. In 1713, he was removed to a congregation at Exeter, where he continued till the year 1718: when the Calvinists among the dissenters proposing a subscription to articles of faith to be signed by all the dissenting ministers in the kingdom, several articles were proposed to him and Mr John Hallet, another dissenting minister at Exeter, in order to their subscribing them, they both refused, imagining this proceeding of their dissenting brethren to be an unworthy imposition on religious liberty and private judgment; for which they were ejected from their congregation. Upon this, a new meeting was opened

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Peirce.

Pekin. for them at Exeter, of which Mr Pierce continued minister till his death, in 1726. He was a man of the strictest virtue, exemplary piety, and great learning. He wrote, 1. *Exercitatio philosophica de Homemeria Anaxagoræ.* 2. Thirteen pieces on the Controversy between the Church of England and the Dissenters. 3. Ten pieces on the Controversy about the Ejection at Exeter. 4. Six pieces on the Doctrine of the Trinity. 5. A Paraphrase and Notes on the Epistles of St Paul to the Colossians, Philippians, and Hebrews. 6. An Essay in favour of giving the Eucharist to Children. 7. Fourteen Sermons.

PEKIN, the capital city of the empire of China in Asia, where the emperor generally resides. It is an exact square, and divided into two parts; namely, that which contains the emperor's palace, which is in the new city, or the Tartars city, because it is inhabited by Tartars ever since they conquered this empire; the other, called the *Old City*, is inhabited by the Chinese. The circuit of both these together is 52 Chinese lys, each of which contains 240 geometrical paces. The gates of this city are high and well arched, supporting buildings of nine stories high; the lowest of which is for the soldiers when they come off guard. The gates are nine in number; and before each is an open space, which serves for a parade. The streets are as straight as a line, most of which are three miles in length, and about 120 feet wide, with shops on both sides; but the houses are poorly built, and have only a ground-floor. It is surprising to see what numbers of people there are in the streets, and not one woman among them; there is always a great confusion, occasioned by the vast numbers of horses, camels, mules, asses, waggons, carts, and chairs, without reckoning the several mobs which gather about jugglers, ballad-singers, and the like. Persons of distinction have always a horseman, who goes before them to clear the way. All the riches and merchandises of the empire are continually pouring into this city. There are always hackney-horses and chairs in various parts, which stand ready to be hired for a trifle; and the owners of them know every street and house where any considerable person lives. All the great streets are guarded by soldiers, who patrol night and day with swords by their sides, and whips in their hands, to chastise those who make any disturbance, or take them into custody. The little streets have lattice-gates at their entrance into the great streets, which are shut up at nights, and guarded by soldiers, who suffer no assemblies in the streets at that time, and examine all that pass along. The emperor's palace is of vast extent, and surrounded with a brick wall, with pavilions at each corner, encompassed by galleries supported by columns. But it would be endless to give an account of the different apartments, with their ornaments and furniture, as well as of the different magazines, and rich commodities kept therein; not to mention the supreme courts of justice, which are six in number, and are only to be controuled by the emperor and the grand council. Those who have computed the compass of this city a different way, observe, that it is 20 miles in circumference, and that the number of inhabitants is at least 2,000,000; that the walls are so high that they cover the town, and are broad enough for several horsemen to ride a breast;

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and there are strong towers a bow-shot distant from each other. The walls of the emperor's palace, including that and the gardens, are about two miles in length; and the architecture of the structures entirely different from that of the Europeans, for they are covered with tiles of a shining beautiful yellow. The temples and the towers of this city are so numerous, that it is difficult to count them. The country about it is plain, but sandy, and not very fruitful; yet provisions of all kinds are exceeding plentiful, they being, as well as the merchandises, brought from other parts by means of canals cut from the rivers, and always crowded with vessels of different sizes. An earthquake which happened here in 1731 buried above 100,000 persons in the ruins of the houses, which were thrown down. E. Long. 116. 41. N. Lat. 39. 54.

PELAGIANS, a Christian sect who appeared about the fifth or end of the fourth century. They maintained the following doctrines. 1. That Adam was by nature mortal, and whether he had sinned or not, would certainly have died. 2. That the consequences of Adam's sin were confined to his own person. 3. That new-born infants are in the same situation with Adam before the fall. 4. That the law qualified men for the kingdom of heaven, and was founded upon equal promises with the gospel. 5. That the general resurrection of the dead does not follow in virtue of our Saviour's resurrection. 6. That the grace of God is given according to our merits. 7. That this grace is not granted for the performance of every moral act; the liberty of the will, and information in points of duty, being sufficient, &c. The founder of this sect was

PELAGIUS, a native of Great Britain; but whether of England, Scotland, or Wales, is as uncertain as it is immaterial. He was born towards the close of the fourth century, and educated in the monastery of Banchor, in Wales, of which he became a monk, and afterwards abbot. In the early part of his life he went over to France, and thence to Rome, where he had the infolence to promulgate certain opinions somewhat different from those of the infallible church. His morals being irreproachable, he gained many disciples; and the dreadful heresy made so rapid a progress, that, for the salvation of souls, it became necessary for the pope to exert his power. Pelagius, to avoid the danger, in the year 409, passed over to Sicily, attended by his friend and pupil Celestius. In 411 they landed in Africa, continued some time at Hippo, and were present at the famous conference between the Catholics and Donatists which was held at Carthage in 412. From thence they travelled to Egypt; and from Egypt, in 415, to Palestine, where they were graciously received by John bishop of Jerusalem. In the same year, Pelagius was cited to appear before a council of seventeen bishops, held at Diospolis. They were satisfied with his creed, and absolved him of heresy. The African bishops, however, being displeased with their proceedings, appealed to the Roman pontiff: he first approved, and afterwards condemned the opinions of Pelagius, who, with his pupil Celestius, was publicly excommunicated; and all the bishops who refused to subscribe the condemnation of the Pelagian heresy were immediately deprived. What became of him after this period, is entirely unknown;

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known;

Pelagius,
Pelagius.

Pelafgi known; but it seems very probable that he retired to
Pelican. Panchor, and died abbot of that monastery. He
 wrote, 1. *Expositionum in epist. Paulinas* lib. xiv.
 2. *Epistola ad Demetriadem de virginitate*. 3. *Ex-*
planationis symboli ad Damafum. 4. *Epistole ad vidua-*
rum duas. 5. *De libero arbitrio*. These and many
 other fragments are scattered among the works of St
 Jerom. They are also collected by Garnerius, and
 published in *Append. op. Mercatoris*, p. 373. *Cave*.

PELASGL See **PELASGIOTIS**.

PELASGIA, (Pliny); the ancient name of *Lef-*
bor; so called from the Pelafgi, its first inhabitants,
 (Diodorus Siculus). Also the ancient name of *Pelo-*
ponnesus, from Pelafgius, a native of the country,
 (Nicolaus Damascenus, Ephorus).

PELASGICUM, (Pausanias, Pliny); the north
 wall of Athens; so called from the builders, the Pe-
 lasgi. There was an execration pronounced on any
 that should build houses under this wall; because the
 Pelafgi, while dwelling there, entered into a conspira-
 cy against the Athenians, (Thucydides).

PELASGIOTIS, a third part of Thessaly, (Stra-
 bo); so called from a very ancient people, the Pelaf-
 gi, called *Pelafgiotæ*, (Ptolemy); who formerly, to-
 gether with the Æolians, occupied Thessaly, and
 thence that part was called *Pelafgicum Argos*; besides
 many other parts of Greece. Their name *Pelafgi*, or
Pelargi, denoting storks, was given them from their
 wandering roving life, (Strabo). The poets extend
 the appellation to Greeks in general. *Pelafgius*, the
 epithet. Some of the inhabitants of Crete were called
Pelafgi, (Homer); who thus also calls the neigh-
 bouring people to the Cilicians in Troas. The Pe-
 lasgi were originally of Arcadia, (Hesiod); but Æs-
 chylus makes Argos, near Mycenæ, their country.
 The Pelafgiotis was situate between Pieria and Mace-
 donia to the north and west, Thessaliotis to the south,
 and Magnesia to the east, (Strabo, Pliny).

PELE, (Stephanus); two towns of this name in
 Thessaly; the one subject to Eurypylus, the other to
 Achilles; both extinct. *Peleus* the genititious name,
 id.

PELETHRONIUM, (Nicander and Scholiast);
 a town of Thessaly, situate in a flowery part of mount
 Pelios; and hence the appellation *throna*, signifying
 flowers. *Pelethronii*, the people, (Virgil); the *Lapi-*
thæ so called, who first broke horses. Lucan says
 the Centaurs were natives of that place; to whom Vir-
 gil assigns mount Othrys. Most authors, however,
 ascribe the breaking of horses to the Centaurs. Some
 make the Lapithæ and Centaurs the same; others a
 different people; allowed however to be both of Thes-
 saly. Their story is greatly involved in fable.

PELICAN, in ornithology. See **PELICANUS**.

PELICAN, in chemistry, is a glass alembic con-
 sisting of one piece. It has a tubulated capital, from
 which two opposite and crooked beaks pass out, and
 enter again at the belly of the cucurbit. This vessel
 has been contrived for a continued distillation and co-
 habitation, which chemists call *circulation*. The volatile
 parts of substances put into this vessel rise into the ca-
 pital, and are obliged to return through the crooked
 beaks into the cucurbit; and this without interruption,
 or luting and unluting the vessels.

Although the pelican seems to be a very convenient

instrument, it is nevertheless little used, and even **Pelicanus**,
 much neglected at present; either because the modern
 chemists have not so much patience as the ancient che-
 mists had for making long experiments; or because
 they find that two matrefles, the mouth of one of
 which is inserted into the mouth of the other, produce
 the same effect.

PELICANUS, in ornithology, a genus belonging
 to the order of anseres. The bill is straight, without
 teeth, and crooked at the point; the face is naked,
 and the feet are palmated. There are eight species,
 principally distinguished by the shape of their tails.
 The most remarkable are,

1. The carbo, or corvorant, sometimes exceeds seven
 pounds in weight; the length three feet four; the
 extent four feet two; the bill dusky, five inches long,
 destitute of nostrils; the base of the lower mandible is
 covered with a naked yellow skin, that extends under
 the chin, and forms a sort of pouch; a loose skin of
 the same colour reaches from the upper mandible round
 the eyes and angles of the mouth; the head and neck
 are of a sooty blackness; but under the chin of the
 male the feathers are white: and the head in that sex
 is adorned with a short loose pendant crest; in some
 the crest and hind-part of the head are streaked with
 white. The coverts of the wings, the scapulars, and
 the back, are of a deep green, edged with black, and
 glossed with blue; the quill-feathers and tail dusky;
 the legs are short, strong, and black; the middle claw
 serrated on the inside; the irides are of a light ash-
 colour.

These birds occupy the highest parts of the cliffs
 that impend over the sea: they make their nests of
 sticks, sea-tang, grass, &c. and lay six or seven white
 eggs of an oblong form. In winter they disperse a-
 long the shores, and visit the fresh waters, where they
 make great havoc among the fish. They are remarka-
 bly voracious, having a most sudden digestion, pro-
 moted by the infinite quantity of small worms that fill
 their intestines. The corvorant has the rankest and
 most disagreeable smell of any bird, even when alive.
 Its form is disagreeable; its voice hoarse and croaking,
 and its qualities base. These birds, however, have
 been trained to fish like falcons to fowl. Whitelock
 tells us, that he had a cast of them manned like hawks,
 and which would come to hand. He took much plea-
 sure in them; and relates, that the best he had
 was one presented him by Mr Wood, master of the
 corvorants to Charles I. It is well known that the
 Chinese make great use of these birds, or a congenere-
 ous sort, in fishing; and that not for amusement, but
 profit.

2. The graculus, or shag, called in the north of
 England the *crane*, is much inferior in size to the cor-
 vorant: the length is 27 inches; the breadth three
 feet six; the weight three pounds three quarters. The
 bill is four inches long, and more slender than that of
 the preceding: the head is adorned with a crest two
 inches long, pointing backward; the whole plumage
 of the upper part of this bird is of a fine and very shi-
 ning green; the edge of the feathers a purplish black;
 but the lower part of the back, the head, and neck,
 wholly green; the belly is dusky; the tail of a dusky
 hue, tinged with green; the legs are black, and like
 those of the corvorant.

Both.

Both these kinds agree in their manners, and breed in the same places; and, what is very strange in webbed-footed birds, will perch and build in trees: both swim with their head quite erect, and are very difficult to be shot; for, like the grebes and divers, as soon as they see the flash of the gun, they pop under water, and never rise but at a considerable distance.

3. The *basianus*, gannet, or solan goose, weighs seven pounds; the length is three feet one inch; the breadth six feet two inches. The bill is six inches long, straight almost to the point, where it inclines down; and the sides are irregularly jagged, that it may hold its prey with more security: about an inch from the base of the upper mandible is a sharp process pointing forward; it has no nostrils; but in their place a long furrow, that reaches almost to the end of the bill: the whole is of a dirty white, tinged with ash-colour. The tongue is very small, and placed low in the mouth; a naked skin of a fine blue surrounds the eyes, which are of a pale yellow, and are full of vivacity: this bird is remarkable for the quickness of its sight. Martin tells us, that *solan* is derived from an Irish word expressive of that quality.

From the corner of the mouth is a narrow slip of black bare skin, that extends to the hind-part of the head; beneath the chin is another, that, like the pouch of the Pelican, is dilatable, and of size sufficient to contain five or six entire herrings; which in the breeding season it carries at once to its mate or young.

The young birds, during the first year, differ greatly in colour from the old ones; being of a dusky hue, speckled with numerous triangular white spots; and at that time resemble in colours the speckled diver. Each bird, if left undisturbed, would only lay one egg in the year; but if that be taken away, they will lay another; if that is also taken, then a third; but never more than that season. Their egg is white, and rather less than that of the common goose; the nest is large, and formed of any thing the bird finds floating on the water, such as grass, sea-plants, shavings, &c. These birds frequent the Isle of Alisa, in the frith of Clyde; the rocks adjacent to St Kilda; the Stack of Soulliskery, near the Orkneys; the Skelig Isles, off the coasts of Kerry, Ireland; and the Bass Isle, in the frith of Edinburgh: the multitudes that inhabit these places are prodigious. Dr Harvey's elegant account of the latter will serve to give some idea of the numbers of these, and of the other birds that annually migrate to that little spot.

"There is a small island, called by the Scotch *Bass Island*, not more than a mile in circumference; the surface is almost wholly covered during the months of May and June with nests, eggs, and young birds; so that it is scarcely possible to walk without treading on them: and the flocks of birds in flight are so prodigious, as to darken the air like clouds; and their noise is such, that you cannot without difficulty hear your next neighbour's voice. If you look down upon the sea from the top of the precipice, you will see it on every side covered with infinite numbers of birds of different kinds, swimming and hunting for their prey: if in sailing round the island you survey the hanging cliffs, you may see in every cragg or fissure of the broken rocks innumerable birds of various sorts and sizes, more than the stars of heaven when viewed in a serene

night: if from afar you see the distant flocks, either flying to or from the island, you would imagine them to be a vast swarm of bees."

Nor do the rocks of St Kilda seem to be less frequented by these birds; for Martin assures us, that the inhabitants of that small island consume annually no less than 22,600 young birds of this species, besides an amazing quantity of their eggs, these being their principal support throughout the year: they preserve both eggs and fowls in pyramidal stone-buildings, covering them with turf-aloes to preserve them from moisture. This is a dear-bought food, earned at the hazard of their lives, either by climbing the most difficult and narrow paths, where (to appearance) they can barely cling, and that too at an amazing height over the raging sea; or else, being lowered down from above, they collect their annual provision, thus hanging in midway air; placing their whole dependence on the uncertain footing of one person, who holds the rope by which they are suspended at the top of the precipice. The young birds are a favourite dish with the North Britons in general: during the season, they are constantly brought from the Bass Isle to Edinburgh, sold at 20d. a-piece, are roasted, and served up a little before dinner as a whet.

The gannets are birds of passage. Their first appearance in those islands is in March; their continuance there till August or September, according as the inhabitants take or leave their first egg; but, in general, the time of breeding, and that of their departure, seems to coincide with the arrival of the herring, and the migration of that fish (which is their principal food) out of those seas. It is probable that these birds attend the herring and pilchard during their whole circuit round the British islands; the appearance of the former being always esteemed by the fishermen as a sure preface of the approach of the latter. It migrates in quest of food as far south as the mouth of the Tagus, being frequently seen off Lisbon during the month of September, plunging for sardines, fish resembling, if not the same with our pilchard.

In the month of August Mr Pennant has observed in Cathness their northern migrations: he has seen them passing the whole day in flocks, from five to fifteen in each: in calm weather they fly high; in storms they fly low and near the shore; but never cross over the land, even when a bay with promontories intervenes, but follow, at an equal distance, the course of the bay, and regularly double every cape. Many of the parties made a sort of halt for the sake of fishing: they soared to a vast height, then darting headlong into the sea, made the water foam and spring up with the violence of their descent; after which they pursued their route. Our author inquired whether they ever were observed to return southward in the spring, but was answered in the negative; so it appears that they annually encircle the whole island.

They are well known on most of the coasts of England, but not by the name of the *Solan goose*. In Cornwall and in Ireland they are called *gannets*; by the Welsh, *gan*. Mr Ray supposed the Cornish gannet to be a species of large gull: a very excusable mistake; for during his six months residence in Cornwall, he never had an opportunity of seeing that bird, except flying; and in the air it has the appearance of

Pelicanus. a gull. On that supposition he gave our skua the title of *cataracla*, a name borrowed from Aristotle, and which admirably expresses the rapid descent of this bird on its prey. Mr Moyle first detected this mistake; and the Rev. Dr William Borlase, by presenting us with a fine specimen of this bird, confirms the opinion of Mr Moyle; at the same time giving the following natural history of the bird.

"The gannet comes on the coasts of Cornwall in the latter end of summer, or beginning of autumn; hovering over the shoals of pilchards that come down to us through St George's Channel from the northern seas. The gannet seldom comes near the land, but is constant to its prey, a sure sign to the fishermen that the pilchards are on the coasts; and when the pilchards retire, generally about the end of November, the gannets are seen no more. The bird now sent was killed at Chandour, near Mountbay, Sept. 30. 1762, after a long struggle with a water-spaniel, assisted by the boatmen; for it was strong and pugnacious. The person who took it observed that it had a transparent membrane over the eye-lid, with which it covered at pleasure the whole eye, without obscuring the sight or shutting the eye-lid; a gracious provision for the security of the eyes of so weighty a creature, whose method of taking its prey is by darting headlong on it from a height of 150 feet or more into the water. About four years ago, one of these birds flying over Penzance, (a thing that rarely happens), and seeing some pilchards lie on a fir-plank, in a cellar used for curing fish, darted itself down with such violence, that it struck its bill quite through the board, (about an inch and a quarter thick), and broke its neck."

These birds are sometimes taken at sea by a deception of the like kind. The fishermen fasten a pilchard to a board, and leave it floating; which inviting bait decoys the unwary gannet to its own destruction.

In the *Cataracla* of Juba may be found many characters of this bird: he says, that the bill is toothed; that its eyes are fiery; and that its colour is white: and in the very name is expressed its furious descent on its prey. The rest of his accounts favour of fable.—We are uncertain whether the gannet breeds in any other parts of Europe besides our own islands; except (as Mr Ray suspects, the fula, described in Clusius's *Exotics*, which breeds in Ferroc Isles) be the same bird.

4. The fula, or booby, is somewhat less than a goose; the basis of the bill yellow, and of bare feathers; the eyes of a light-grey colour; the lower part of the bill of a light brown. The colours of the body are brown and white; but varied so in different individuals, that they cannot be described by them. Their wings are very long; their legs and feet pale yellow, shaped like those of corvoraux. They frequent the Bahama islands, where they breed all months in the year, laying one, two, or three eggs on the bare rock. While young, they are covered with a white down, and continue so till they are almost ready to fly. They feed on fish like the rest of this genus; but have a very troublesome enemy of the man of war bird, which lives on the spoils obtained from other sea-birds, particularly the booby. As soon as this rapacious enemy perceives that the booby has taken a

fish, he flies furiously at him, upon which the former dives to avoid the blow; but as he cannot swallow his prey below water, he is soon obliged to come up again with the fish in his bill as before, when he suffers a new assault; nor does his enemy cease to persecute him till he lets go the fish, which the other immediately carries off.

5. The great booby, by Linnæus called *pelicanus* *Balsani pufius*, frequents the rivers and sea-coasts of Florida, pursuing and devouring fishes like others of the genus. Mr Catesby informs us, that he has several times found them disabled, and sometimes dead, on the shore; whence he thinks that they meet with sharks or other voracious fishes, which destroy them. The bird is about the size of a goose; the head and neck remarkably prominent; the back of a brown colour; the belly dusky white; the feet black, and shaped like those of a corvoraux; the head elegantly spotted with white; the wings extend six feet when spread. Both this species and the last have a joint in the upper mandible of the bill, by which they can raise it considerably from the lower one without opening the mouth.

6. The onocrotalus, or pelican of Asia, Africa, and America; though Linnæus thinks that the pelican of America may possibly be a distinct variety. This creature, in Africa, is much larger in the body than a swan, and somewhat of the same shape and colour. Its four toes are all webbed together; and its neck in some measure resembles that of a swan; but that singularity in which it differs from all other birds is in the bill and the great pouch underneath. This enormous bill is 15 inches from the point to the opening of the mouth, which is a good way back behind the eyes. At the base the bill is somewhat greenish, but varies towards the end, being of a reddish blue. It is very thick in the beginning, but tapers off to the end, where it hooks downwards. The under-chap is still more extraordinary; for to the lower edges of it hang a bag, reaching the whole length of the bill to the neck, which is said to be capable of containing 15 quarts of water. This bag the bird has a power of wrinkling up into the hollow of the under-chap; but by opening the bill, and putting one's hand down into the bag, it may be distended at pleasure. The skin of which it is formed will then be seen of a bluish ash-colour, with many fibres and veins running over its surface. It is not covered with feathers, but a short downy substance as smooth and as soft as satin, and is attached all along the under edges of the chap, to be fixed backward to the neck of the bird by proper ligaments, and reaches near half way down. When this bag is empty it is not seen; but when the bird has filled with success, it is then incredible to what an extent it is often seen dilated. For the first thing the pelican does in filling is to fill up the bag; and then it returns to digest its burden at leisure. When the bill is opened to its widest extent, a person may run his head into the bird's mouth, and conceal it in this monstrous pouch, thus adapted for very singular purposes. Yet this is nothing to what Ruyfch assures us, who avers that a man has been seen to hide his whole leg, boot and all, in the monstrous jaws of one of these animals. At first appearance this would seem impossible, as the sides of the under chap, from which the bag depends, are

Fig. 2.



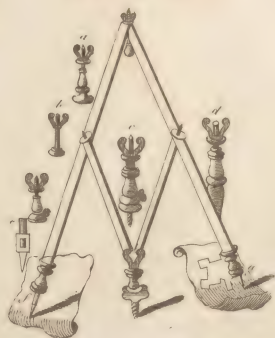
PELECANUS

Fig. 1.



Fig. 3.

PENTAGRAPH



Pelicanus. not above an inch asunder when the bird's bill is first opened; but then they are capable of great separation; and it must necessarily be so, as the bird preys upon large fishes, and hides them by dozens in its pouch. Tertre affirms, that it will hide as many fish as will serve 60 hungry men for a meal.

The pelican was once also known in Europe, particularly in Russia; but it seems to have deserted our coasts. This is the bird of which so many fabulous accounts have been propagated; such as its feeding its young with its own blood, and its carrying a provision of water for them in its great reservoir in the desert. But the absurdity of the first account answers itself; and as for the latter, the pelican uses its bag for very different purposes than that of filling it with water.

Its amazing pouch may be considered as analogous to the crop in other birds; with this difference, that as their lies at the bottom of the gullet, so this is placed at the top. Thus, as pigeons and other birds macerate their food for their young in their crops, and then supply them; so the pelican supplies its young by a more ready contrivance, and macerates their food in its bill, or stores it for its own particular sustenance.

The ancients were particularly fond of giving this bird admirable qualities and parental affections: struck, perhaps, with its extraordinary figure, they were willing to supply it with as extraordinary appetites; and having found it with a large reservoir, they were pleased with turning it to the most tender and parental uses. But the truth is, the pelican is a very heavy, sluggish, voracious bird, and very ill fitted to take those flights, or to make those cautious provisions for a distant time, which we have been told they do.

The pelican, says Labat, has strong wings, furnished with thick plumage of an ash-colour, as are the rest of the feathers over the whole body. Its eyes are very small, when compared to the size of its head; there is a sadness in its countenance, and its whole air is melancholy. It is as dull and reluctant in its motions as the flamingo is sprightly and active. It is slow of flight; and when it rises to fly, performs it with difficulty and labour. Nothing, as it would seem, but the spur of necessity could make these birds change their situation, or induce them to ascend into the air: but they must either starve or fly.

They are torpid and inactive to the last degree, so that nothing can exceed their indolence but their gluttony; it is only from the stimulations of hunger that they are excited to labour; for otherwise they would continue always in fixed repose. When they have raised themselves about 30 or 40 feet above the surface of the sea, they turn their head with one eye downwards, and continue to fly in that posture. As soon as they perceive a fish sufficiently near the surface, they dart down upon it with the swiftness of an arrow, seize it with unerring certainty, and store it up in their pouch. They then rise again, though not without great labour, and continue hovering and fishing, with their head on one side as before.

This work they continue with great effort and industry till their bag is full, and then they fly to land to devour and digest at leisure the fruits of their industry. This, however, it would appear, they are not long performing; for towards night they have another hun-

gry call; and they again reluctantly go to labour. At night, when their fishing is over, and the toil of the day crowned with success, these lazy birds retire a little way from the shore; and, though with the webbed feet and clumsy figure of a goose, they will be contented to perch nowhere but upon trees among the light and airy tenants of the forest. There they take their repose for the night; and often spend a great part of the day, except such times as they are fishing, sitting in dismal solemnity, and, as it would seem, half asleep. Their attitude is with the head resting upon their great bag, and that resting upon their breast. There they remain without motion, or once changing their situation, till the calls of hunger break their repose, and till they find it indispensibly necessary to fill their magazine for a fresh meal. Thus their life is spent between sleeping and eating; and our author adds, that they are as foul as they are voracious, as they are every moment voiding excrements in heaps as large as one's fist.

The same indolent habits seem to attend them even in preparing for incubation, and defending their young when excluded. The female makes no preparation for her nest, nor seems to choose any place in preference to lay in; but drops her eggs on the bare ground to the number of five or six, and there continues to hatch them. Attached to the place, without any desire of defending her eggs or her young, she tamely sits and suffers them to be taken from under her. Now and then she ventures to peck, or to cry out when a person offers to beat her off.

She feeds her young with fish macerated for some time in her bag; and when they cry flies off for a new supply. Labat tells us, that he took two of these when very young, and tied them by the leg to a post stuck into the ground, where he had the pleasure of seeing the old one for several days come to feed them, remaining with them the greatest part of the day, and spending the night on the branch of a tree that hung over them. By these means they were all three become so familiar, that they suffered themselves to be handled; and the young ones very kindly accepted whatever fish he offered them. These they always put first into their bag, and then swallowed at their leisure.

It seems, however, that they are but disagreeable and useless domestics; their gluttony can scarcely be satisfied; their flesh smells very rancid; and tastes a thousand times worse than it smells. The native Americans kill vast numbers; not to eat, for they are not fit even for the banquet of a savage; but to convert their large bags into purses and tobacco-pouches. They bestow no small pains in dressing the skin with salt and ashes, rubbing it well with oil, and then forming it to their purpose. It thus becomes so soft and pliant, that the Spanish women sometimes adorn it with gold and embroidery to make work-bags of.

Yet, with all the seeming hebetude of this bird, it is not entirely incapable of instruction in a domestic state. Father Raymond assures us, that he has seen one so tame and well educated among the native Americans, that it would go off in the morning at the word of command, and return before night to its master, with its great paunch distended with plunder; a part of which the savages would make it disgorge, and

Pellion,
Pella.

and a part they would permit it to reserve for itself.

"The pelican," as Faber relates, "is not destitute of other qualifications. One of those which was brought alive to the duke of Bavaria's court, where it lived 40 years, seemed to be possessed of very uncommon sensations. It was much delighted in the company and conversation of men, and in music both vocal and instrumental; for it would willingly stand," says he, "by those that sung or sounded the trumpet; and stretching out its head, and turning its ear to the music, listened very attentively to its harmony, though its own voice was little pleasanter than the braying of an ass." Gesner tells us, that the emperor Maximilian had a tame pelican which lived for above 80 years, and that always attended his army on their march. It was one of the largest of the kind, and had a daily allowance by the emperor's orders. As another proof of the great age to which the pelican lives, Aldrovandus makes mention of one of these birds that was kept several years at Mechlin, and was verily believed to be 50 years old.—We often see these birds at our fairs about town.

PELION, (Diodorus Siculus, &c.) *Pelios, mons* understood, (Mela, Virgil, Horace, Seneca), a mountain of Thessaly near Ossa, and hanging over the Sinus Pelagicus, or Paganicus; its top covered with pines, the sides with oaks, (Ovid). Said also to abound in wild ash, (Val. Flaccus). From this mountain was cut the spear of Achilles, called *pelias*; which none but himself could wield, (Homer). Dicaearchus, Aristotle's scholar, found this mountain 1250 paces higher than any other of Thessaly, (Pliny). *Pelios*, Cicero; *Peliacus*, (Catullus), the epithet.

PELLA, (anc. geog.) a town situate on the confines of Emathia, a district of Macedonia, (Ptolemy); and therefore Herodotus allots it to Bottiaea, a maritime district on the Sinus Thermaicus. It was the royal residence, situate on an eminence, verging to the south-west, encompassed with unpassable marshes summer and winter: in which, next the town, a citadel like an island rises, placed on a bank or dam, a prodigious work, both supporting the wall and securing it from any hurt by means of the circumfluent water. At a distance, it seems close to the town, but is separated from it by the Ludias, running by the walls, and joined to it by a bridge, (Livy): distant from the sea 120 stadia, the Ludias being so far navigable, (Strabo). Mela calls the town *Pelle*, though most Greek authors write *Pella*. The birth-place of Philip, who enlarged it; and afterwards of Alexander, (Strabo, Mela). Continued to be the royal residence down to Perles, (Livy). Called *Pella Colonia*, (Pliny); *Colonia Julia Augusta*, (Coin). It afterwards came to decline, with but few and mean inhabitants, (Lucian). It is now called *Τα Παλιόπολις*, the *Little Palace*, (Hollstenius). *Pelleus*, both the gentilitial name and the epithet, (Lucian, Juvenal, Martial).—Another PELLA, (Polybius, Pliny); a town of the Decapolis, on the other side the Jordan; abounding in water, like its cognominal town in Macedonia; built by the Macedonians, (Strabo); by Seleucus, (Eusebius); and anciently called *Butis*, (Stephanus); *Apamea*, (Strabo); situate 35 miles to the north-east of Gerasa, (Ptolemy). Thither the Christians, just before the siege of Jerusalem by Titus, were divinely admonished to fly, (Euse-

bias). It was the utmost boundary of the Perææ, or Transjordan country, to the north, (Josephus).

PELLETIER (JAMES), a doctor of physic, and an eminent mathematician, was born in 1517. He was an excellent Latin and French poet, a good orator, physician, and grammarian. He wrote, *Oeuvres Poétiques, Commentaires Latins sur Euclide, &c.*

PELLETS, in heraldry, those roundels that are black; called also *ogresses* and *gunstones*, and by the French *torceaux de sable*.

PELLICLE, among physicians, denotes a thin film or fragment of a membrane. Among chemists it signifies a thin surface of crystals uniformly spread over a saline liquor evaporated to a certain degree.

PELLISON, or PELLISON FONTANIER, (Paul), one of the finest geniuses of the 17th century, was the son of James Pellison counsellor at Caëtres. He was born at Beziers in 1624, and educated in the Protestant religion. He studied with success the Latin, Greek, French, Spanish, and Italian tongues, and applied himself to the reading the best authors in these languages; after which he studied the law at Caëtres with reputation. In 1652 he purchased the post of secretary to the king; and, five years after, became first deputy to M. Fouquet. He suffered by the disgrace of that minister; and in 1661 was confined in the Bastille; from whence he was not discharged till four years after. During his confinement he applied himself to the study of controversy; and in 1670 abjured the Protestant religion. Lewis XIV. bestowed upon him an annual pension of 2000 crowns; and he likewise enjoyed several posts. In 1676 he had the abbey of Giment, and some years after the priory of St Orens at Auch. He died in 1693. His principal works are, 1. The History of the French Academy. 2. Reflections on religious Disputes, &c. in 4 vols 12mo. 3. The History of Lewis XIV. 4. Historical Letters and Miscellanies, in 3 vols 12mo.

PELOPONNESUS, (Dionysius); a large peninsula, to the south of the rest of Greece; called, as it were, *Pelopis nefus* or *insula*, though properly not an island, but a peninsula; yet wanting but little to be one, viz. the isthmus of Corinth, ending in a point like the leaf of the Platane or plane-tree. Anciently called *Apia* and *Pelagisa*; a peninsula second to no other country for nobleness; situate between two seas, the Egean and Ionian, and resembling a platane-leaf, on account of its angular recesses or bays, (Pliny, Strabo, Mela). Strabo adds from Homer, that one of its ancient names was *Argos*, with the epithet *Achaicum*, to distinguish it from Thessaly, called *Pelagicum*. Divided into six parts; namely, Argolia, Laconica, Messenia, Elis, Achaia, and Arcadia, (Mela). Now called the *Morea*.

PELOPS, in fabulous history, the son of Tantalus king of Phrygia, went into Elis, where he married Hippodamia the daughter of Oenomaus king of that country; and became so powerful, that all the territory which lies beyond the Isthmus, and composes a considerable part of Greece, was called *Peloponnesus*, that is, the *island of Pelops*, from his name, and the word *Nessus*.

PELUSIUM, (anc. geogr.); a noble and strong city of Egypt, without the Delta, distant 20 stadia from the sea; situate amidst marshes; and hence its

Pelletier
||
Pelusium.

Pelvis
Pen.

name and its strength. Called the *key* or *inlet* of *Egypt*, (Diodorus, Hirtius); which being taken, the rest of Egypt lay quite open and exposed to an enemy. Called *Sin*, (Ezekiel). *Pelygiacus*, the epithet, (Virgil, Diodorus). From its ruins arose Damietta. E. Long. 32° N. Lat. 31°.

PELVIS, in anatomy. See there, n° 38.—41.

PEMBROKE, (Mary Countess of). See HERBERT.

PEMBROKESHIRE, a county of Wales, bounded on all sides by the Irish sea, except on the east, where it joins to Caermarthenshire, and on the north-east to Cardiganshire. It lies the nearest to Ireland of any county in Wales. Its length is 26 miles, its breadth 20, and its circumference 93; within which it contains about 420,000 acres, 145 parishes, 7 hundreds, 1 city, 9 market-towns, 2 fowells, and about 26,000 inhabitants. This county lies in the diocese of St David's, and sends three members to parliament, viz. one for the shire, one for Haverfordwell, and one for the town of Pembroke.

The air of Pembrokehire, considering its situation, is good; but it is in general better the farther from the sea. As there are but few mountains, the soil is generally fruitful, especially on the sea-coasts; nor are its mountains altogether unprofitable, but produce pasture sufficient to maintain great numbers of sheep and goats. Its other commodities are corn, cattle, pit-coal, marble, fish, and fowl. Among these last are falcons, called here *peregrins*. The inhabitants of this county make a very pleasant durable fire of culm, which is the dust of coal made up into balls, with a third part of mud. The county is well watered by the rivers Clethy, Doulgedy, Cledhew, and Teive; which last parts it from Cardiganshire. There is a division of the county styled *Rhos* in the Welsh, by which is meant a large green plain. This is inhabited by the descendants of the Flemings, placed there by Henry I. to curb the Welsh, who were never able to expel them, though they often attempted it. On the coasts of this county, as well as on those of Glamorganshire and the Severn Sea, is found the *lactuca marina* of Cambden, being a marine plant or weed, which, when dressed in a certain manner, is eaten by the inhabitants, and called *laver*, or *black butter*.

PEN, a little instrument, usually formed of a quill, serving to write withal.

Pens are also sometimes made of silver, brass, or iron.

Dutch Pens, are made of quills that have passed thro' hot ashes, to take off the grosser fat and moisture, and render them more transparent.

Fountain Pen, is a pen made of silver, brass, &c. contrived to contain a considerable quantity of ink, and let it flow out by gentle degrees, so as to supply the writer a long time without being under the necessity of taking fresh ink.

The fountain-pen is composed of several pieces, as in Plate CCXXXII. fig. 3. where the middle piece F carries the pen, which is screwed into the inside of a little pipe, which again is soldered to another pipe of the same bigness as the lid G; in which lid is soldered a male screw, for screwing on the cover, as also for stopping a little hole at the place, and hindering the ink from passing through it. At the other end of the

piece F is a little pipe, on the outside of which the top-cover H may be screwed. In the cover there goes a port-crayon, which is to be screwed into the last-mentioned pipe, in order to stop the end of the pipe, into which the ink is to be poured by a funnel. To use the pen, the cover G must be taken off, and the pen a little shaken, to make the ink run more freely.

PEN, or *Penstock*. See PENSTOCK.

PENANCE, a punishment, either voluntary or imposed by authority, for the faults a person has committed. Penance is one of the seven sacraments of the Romish church. Besides fasting, alms, abstinence, and the like, which are the general conditions of penance, there are others of a more particular kind; as the repeating a certain number of ave-marys, paternosters, and credos, wearing a hair-shirt, and giving one's self a certain number of stripes. In Italy and Spain it is usual to see Christians almost naked, loaded with chains and a cross, and lashing themselves at every step.

PENATES, in Roman antiquity, a kind of tutelar deities, either of countries or particular houses; in which last sense they differed in nothing from the lares. See LARES.

The penates were properly the tutelar gods of the Trojans, and were only adopted by the Romans, who gave them the title of *penates*.

PENCIL, an instrument used by painters for laying on their colours. Pencils are of various kinds, and made of various materials; the larger sorts are made of boars bristles, the thick ends of which are bound to a stick, bigger or less, according to the uses they are designed for: these, when large, are called *brushes*. The finer sorts of pencils are made of camels, badgers, and squirrels hair, and of the down of swans; these are tied at the upper end with a piece of strong thread, and inclosed in the barrel of a quill.

All good pencils, on being drawn between the lips, come to a fine point.

PENCIL, is also an instrument used in drawing, writing, &c. made of long pieces of black-lead, or red-chalk, placed in a groove cut in a slip of cedar; on which other pieces of cedar being glued, the whole is planed round, and one of the ends being cut to a point, it is fit for use.

Black-lead in fine powder, stirred into melted sulphur, unites with it so uniformly, and in such quantity, in virtue perhaps of its abounding with sulphur, that though the compound remains fluid enough to be poured into moulds, it looks nearly like the coarser sorts of black-lead itself. Probably the way which prince Rupert is said to have had, mentioned in the third volume of Dr Birch's History of the Royal Society, of making black-lead run like a metal in a mould, so as to serve for black-lead again, consisting in mixing with it sulphur or sulphureous bodies.

On this principle the German black-lead pencils are said to be made; and many of those which are hawked about by certain persons among us are prepared in the same manner: their melting or softening, when held in a candle, or applied to a red-hot iron, and yielding a bluish flame, with a strong smell like that of burning brimstone, betrays their composition; for black-lead itself yields no smell or fume, and suffers no

Pen
Pencil.

Pendant # Pendulum. apparent alteration in that heat. Pencils made with such additions are of a very bad kind; they are hard, brittle, and do not cast or make a mark freely either on paper or wood, rather cutting or scratching them than leaving a coloured stroke.

The true English pencils (which Vogel in his mineral system, and some other foreign writers, imagine to be prepared also by melting the black-lead with some additional substances, and casting it into a mould) are formed of black-lead alone, sawed into slips, which are fitted into a groove made in a piece of wood, and another slip of wood glued over them: the softest wood, as cedar, is made choice of, that the pencil may be the easier cut; and a part at one end, too short to be conveniently used after the rest has been worn and cut away, is left unfilled with the black-lead, that there may be no waste of so valuable a commodity. These pencils are greatly preferable to the others, though seldom so perfect as could be wished, being accompanied with some degree of the same inconveniences, and being very unequal in their quality, on account of different sorts of the mineral being fraudulently joined together in one pencil, the fore-part being commonly pretty good, and the rest of an inferior kind. Some, to avoid these imperfections, take the finer pieces of black-lead itself, which they saw into slips, and fix for use in port-crayons: this is doubtless the surest way of obtaining black-lead crayons, whose goodness can be depended on.

PENDANT, an ornament hanging at the ear, frequently composed of diamonds, pearls, and other jewels.

PENDANTS, in heraldry, parts hanging down from the label, to the number of three, four, five, or six at most, resembling the drops in the Doric freeze. When they are more than three, they must be specified in blazoning.

PENDANTS of a Ship, are those streamers, or long colours, which are split and divided into two parts, ending in points, and hung at the head of masts, or at the yard-arm ends.

PENDULOUS, a term applied to any thing that bends or hangs downwards.

PENDULUM, in mechanics, denotes any heavy body, so suspended as that it may vibrate or swing, backwards and forwards, about some fixed point, by the force of gravity.

The vibrations of a pendulum are called its oscillations.

Plate CCXXII. A pendulum, therefore, is any body, B, (fig. 2. n° 1.) suspended upon, and moving about, a fixed point, A, as a centre.

The nature of a pendulum consists in the following particulars: 1. The times of the vibrations of a pendulum, in very small arches, are all equal. 2. The velocity of the bob, in the lowest point, will be nearly as the length of the chord of the arch which it describes in the descent. 3. The times of vibration in different pendulums, AB, AC, are as the square roots of the times of their vibrations. 4. The time of one vibration is to the time of the descent, through half the length of the pendulum, as the circumference of a circle to its diameter. 5. Whence the length of a pendulum, vibrating seconds, will be found 39.2 inches nearly; and that of an half-second pendulum

9.8 inches. 6. An uniform homogeneous body BG, (ibid. n° 2.) as a rod, staff, &c. which is one-third part longer than a pendulum AD, will vibrate in the same time with it.

From these properties of the pendulum we may discern its use as an universal chronometer, or regulator of time, as it is used in clocks, and such like machines. By this instrument also we can measure the distance of a ship, by measuring the interval of time between the fire and the sound of the gun; also the distance of a cloud, by numbering the seconds or half-seconds between the lightning and thunder. Thus, suppose between the lightning and thunder, we number 10 seconds; then, because sound passes through 1142 feet in one second, we have the distance of the cloud equal to 11420 feet. Again, the height of any room, or other object, may be measured by a pendulum vibrating from the top thereof. Thus, suppose a pendulum from the height of a room vibrates once in three seconds; then say, as 1 is to the square of 3, viz. 9, so is 39.2 to 352.8 feet, the height required. Lastly, By the pendulum we discover the different force of gravity on diverse parts of the earth's surface; and thence the true figure of the earth.

When pendulums were first applied to clocks, they were made very short: and, the arches of the circle being large, the time of vibration through different arches could not in that case be equal; to effect which, the pendulum was contrived to vibrate in the arch of a cycloid, by making it play between two semi-cycloids, CB, CD, (ibid. n° 3.) whereby it describes the cycloid BE, AD; the property of which curve is, that a body vibrating in it will describe all its arches, great or small, in equal times.

In all that has been hitherto said, the power of gravity has been supposed constantly the same. But if the said power varies, the lengths of pendulums must vary in the same proportion, in order that they may vibrate in equal times; for we have shewn, that the ratio of the times of vibration and descent through half the lengths is given, and consequently the times of vibration and descent through the whole length is given: But the times of vibration are supposed equal, therefore the times of descent through the lengths of the pendulum are equal. But bodies descending thro' unequal spaces, in equal times, are impelled by powers that are as the spaces described, that is, the powers of gravity are as the lengths of the pendulums.

The greatest inconvenience attending this most useful instrument is, that it is constantly liable to an alteration of its length, from the effects of heat and cold, which very sensibly expand and contract all metalline bodies.

To remedy this inconvenience, the common method is by applying the bob of the pendulum with a screw; so that it may be at any time made longer or shorter, according as the bob is screwed downwards or upwards, and thereby the time of its vibrations keeps always the same. Again, if a glass or metalline tube, uniform throughout, filled with quicksilver, and 58.8 inches long, were applied to a clock, it would vibrate seconds for $39.2 = \frac{1}{2}$ of 58.8; and such a pendulum admits of a twofold expansion and contraction, viz. one of the metal and the other of the mercury; and these will be at the same time contrary, and therefore will

cor-

Pendulum. correct each other. For by what we have shewn, the metal will extend in length with heat, and so the pendulum will vibrate slower on that account. The mercury also will expand with heat; and since by this expansion it must extend the length of the column upward, and consequently raise the centre of oscillation; so that by this means its distance from the point of suspension will be shortened, and therefore the pendulum on this account will vibrate quicker: wherefore, if the circumstances of the tube and mercury are skilfully adjusted, the time of the clock might by this means, for a long course of time, continue the same, without any sensible gain or loss.

This is the invention of the late ingenious Mr Graham, in the year 1721, who made a clock of this sort, and compared it with one of the best of the common sort for three years together, and found the errors of the former but about $\frac{1}{4}$ part of the latter; of which the reader may see a farther account in Phil. Trans. n^o 393. It is what is now called *Mr Graham's quicksilver pendulum*.

In the 47th volume of the Phil. Trans. Mr Short gives us an account of other inventions to remedy the same inconvenience. Mr John Harrison of Barrow, in Lincolnshire, famous for his invention of a clock to find the difference of longitude at sea, without having the least knowledge of what Mr Graham had done before him, made several experiments upon wires of different metals, in order to find their different degrees of expansion and contraction. He thought, that by a proper combination of wires of two different metals, differing considerably in their expansion and contraction, he might be enabled to keep the centre of oscillation of a pendulum always at the same distance from the point of suspension. In consequence of these experiments, he made a pendulum consisting of one steel-wire, at the end of which is the bob or weight; and on each side of this wire, four wires, alternately brass and steel, so disposed and contrived as to raise the pendulum by the same quantity that it is lengthened by heat, and to let down the pendulum in the same proportion as it is raised by cold.

Mr Harrison, in his first machine for measuring time at sea, likewise applied this combination of wires of brass and steel, to prevent any alterations by heat and cold. And in the two machines or clocks he has since made for the same purpose, a like method of guarding against the irregularities arising from this cause is used.

Mr Graham also made a pendulum consisting of three bars, one of steel between two of brass; and the steel bar acted upon a lever, so as to raise the pendulum, when lengthened by heat, and to let it down, when shortened by cold; but he found this clock liable to sudden starts and jerks in its motion.

The ingenious Mr Ellicott, in the same volume of the Transactions, describes a pendulum of his invention, composed of brass and iron, with the method of applying it, so as to avoid the many jerks to which the machine might be liable.

But besides the irregularities arising from heat and cold, pendulum-clocks are liable to others from friction and foulness; to obviate which, Mr Harrison has several excellent contrivances, whereby his clocks are

almost entirely free from friction, and never need to be cleaned.

PENELOPE, in fabulous history, the daughter of Icarus, married Ulysses, by whom she had Telemachus. During the absence of Ulysses, who was gone to the siege of Troy, and who staid 20 years from his dominions, several princes, charmed with Penelope's beauty, told her that Ulysses was dead, offered to marry her, and pressed her to declare in their favour. She promised compliance on condition they would give her time to finish a piece of tapestry she was weaving; but at the same time she undid in the night what she had done in the day, and by this artifice eluded their importunity till Ulysses's return.

PENESTICA, (Antonine), a town of the Helvetii, situated between the Lacus Lanconius and Salodurum; called *Penisica* by Peutinger. Thought now to be *Biel*, (Cluverius); the capital of a small territory in Switzerland.

PENEUS, (Strabo); a river running through the middle of Thessaly, from west to east, into the Sinus Thermaicus, between Olympus and Ossa, near Tempe of Thessaly, rising in mount Pindus, (Ovid, Val. Flaccus).

PENETRALE, in Roman antiquity, properly denoted the *chapel*, consecrated to the penates or household gods.

PENICILLUS, among surgeons, is used for a tent to be put into wounds or ulcers.

PENINSULA, in geography, a portion or extent of land joining to the continent by a narrow neck or isthmus, the rest being encompassed with water. See Plate CXVI.

PENIS, in anatomy. See there, n^o 371, o.

PENITENTS, an appellation given to certain fraternities of penitents distinguished by the different shape and colour of their habits. These are secular societies, who have their rules, statutes, and churches, and make public processions under their particular crosses or banners. Of these there are more than a hundred, the most considerable of which are as follows: the white penitents, of which there are several different sorts at Rome, the most ancient of which was constituted in 1264: the brethren of this fraternity every year give portions to a certain number of young girls, in order to their being married: their habit is a kind of white sackcloth, and on the shoulder is a circle, in the middle of which is a red and white cross. Black penitents, the most considerable of which are the brethren of mercy, instituted in 1488, by some Florentines, in order to assist criminals during their imprisonment, and at the time of their death: on the day of execution, they walk in procession before them, singing the seven penitential psalms and the litanies; and after they are dead, they take them down from the gibbet and bury them: their habit is black sackcloth. There are others whose business it is to bury such persons as are found dead in the streets: these wear a death's head on one side of their habit. There are also blue, grey, red, green, and violet penitents; all which are remarkable for little else besides the different colours of their habits.

Maillon tells us, that at Turin there are a set of penitents kept in pay to walk through the streets in procession,

Penitential
Penn.

cession, and cut their shoulders with whips, &c.

PENITENTIAL, an ecclesiastical book retained among the Romanists; in which is prescribed what relates to the imposition of penance and the reconciliation of penitents. See **PENANCE**.

There are various penitentials, as the Roman penitential, that of the venerable Bede, that of pope Gregory III. &c.

PENITENTIARY, in the ancient Christian church, a name given to certain presbyters or priests, appointed in every church to receive the private confessions of the people, in order to facilitate public discipline, by acquainting them what sins were to be expiated by public penance, and to appoint private penance for such private crimes as were not proper to be publicly censured.

PENITENTIARY, at the court of Rome, is an office in which are examined and delivered out the secret bulls, graces, or dispensations relating to cases of conscience, confessions, &c.

PENITENTIARY, is also an officer, in some cathedrals, vested with power from the bishop to absolve, in cases referred to him. The pope has at present his grand penitentiary, who is a cardinal, and the chief of the other penitentiary priests established in the church of Rome, who consult him in all difficult cases. He presides in the penitentiary, dispatches dispensations, absolutions, &c. and has under him a regent and 24 proctors, or advocates of the sacred penitentiary.

PENN (Sir William), was born at Bristol in 1621, and inclined from his youth to maritime affairs. He was made captain at 21 years of age, rear-admiral of Ireland at 23, vice-admiral of Ireland at 25, admiral to the Straights at 29, vice-admiral of England at 31, and general in the first Dutch war at 32. Whence returning in 1655, he was chosen representative for the town of Weymouth; and in 1660 was made commissioner of the admiralty and navy, governor of the town and fort of Kinsale, vice-admiral of Munster, and a member of that provincial council. In 1664 he was chosen great captain-commander under the duke of York, and distinguished himself in an engagement against the Dutch fleet; after which he took leave of the sea, but continued in his other employments till 1669. He died in 1670.

PENN (William), an eminent writer among the Quakers, and the planter and legislator of Pennsylvania, was the son of the above Sir William Penn, and was born at London in 1644. In 1660, he was entered a gentleman commoner of Christ-Church, in Oxford; but having before received an impression from the preaching of one Thomas Loc a Quaker, withdrew with some other students from the national worship, and held private meetings, where they preached and prayed amongst themselves. This giving great offence to the heads of the college, Mr Penn, though but 16 years of age, was fined for nonconformity; and continuing his religious exercises, was at length expelled his college. Upon his return home, he was, on the same account, treated with great severity by his father, who at last turned him out of doors; but his resentment afterwards abating, he sent him to France in company with some persons of quality; where he continued a considerable time, and returned not only well skilled in the French language, but a polite and accomplished

Penn.

gentleman. About the year 1666, his father committed to his care a considerable estate in Ireland. Being found in one of the Quakers meetings in Cork, he, with many others, was thrown into prison; but on his writing to the earl of Orrery, was soon discharged. However, his father being informed he still adhered to his opinions, sent for him to England, and finding him inflexible to all his arguments, turned him out of doors a second time. About the year 1668, he became a public preacher among the Quakers; and that year was committed close prisoner to the Tower, where he wrote several treatises. Being discharged after seven months imprisonment, he went to Ireland, where he also preached amongst the Quakers. Returning to England, he was, in 1670, committed to Newgate for preaching in Gracechurch-street meeting-house, London; but being tried at the sessions-house in the Old Bailey, he was acquitted. In September the same year, his father died; and being perfectly reconciled to him, left him both his paternal blessing and a plentiful estate. But his persecutions were not yet at an end; for, in 1671, he was committed to Newgate for preaching at a meeting in Wheeler-street, London; and during his imprisonment, which continued six months, he also wrote several treatises. After his discharge, he went into Holland and Germany; and in the beginning of the year 1672, married and settled with his family at Rickmanworth in Hertfordshire. The same year he published several pieces; and particularly one against Reeve and Muggleton. In 1677, he again travelled into Holland and Germany in order to propagate his opinions; and had frequent conversations with the princess Elizabeth, daughter to the queen of Bohemia, and sister to the princess Sophia, mother to king Geo. I. In 1681, king Charles II. in consideration of the services of Mr Penn's father, and several debts due to him from the crown at the time of his decease, granted Mr Penn and his heirs the province lying on the west side of the river Delaware in North America, which from thence obtained the name of *Pennsylvania*. Upon this Mr Penn published a brief account of that province, with the king's patent; and proposing an easy purchase of lands, and good terms of settlement for such as were inclined to remove thither, many went over. These having made and improved their plantations to good advantage, the governor, in order to secure the planters from the native Indians, appointed commissioners to purchase the land he had received from the king of the native Indians, and concluded a peace with them. The city of Philadelphia was planned and built; and he himself drew up the fundamental constitutions of Pennsylvania in 24 articles. In 1681, he was elected a member of the Royal Society; and the next year he embarked for Pennsylvania, where he continued about two years, and returned to England in August 1684. Upon the accession of king James to the throne, he was taken into a great degree of favour with his Majesty, which exposed him to the imputation of being a Papist; but from which he fully vindicated himself. However, upon the Revolution, he was examined before the council, in 1688, and obliged to give security for his appearance on the first day of next term, which was afterwards continued. He was several times discharged and examined; and at length warrants being issued out against him, he was obliged to conceal himself

Penni.

self for two or three years. Being at last permitted to appear before the king and council, he represented his innocence so effectually that he was acquitted. In August 1699, he, with his wife and family, embarked for Pennsylvania; whence he returned in 1701, in order to vindicate his proprietary right, which had been attacked during his absence. Upon queen Anne's accession to the crown, he was in great favour with her, and was often at court. But, in 1707, he was involved in a lawsuit with the executors of a person who had been formerly his steward; and, though many thought him aggrieved, the court of chancery did not think proper to relieve him; upon which account he was obliged to live within the rules of the Fleet for several months, till the matter in dispute was accommodated. He died in 1718. Mr Penn's friendly and pacific manner of treating the Indians produced in them an extraordinary love for him and his people; so that they have maintained a perfect amity with the English in Pennsylvania ever since. He was the greatest bulwark of the Quakers; in whose defence he wrote numberless pieces. Besides the above works, he wrote a great number of others; the most esteemed of which are, 1. His Primitive Christianity revived. 2. His defence of a paper, intitled *Gospel Truths, against the Exceptions of the Bishop of Cork*. 3. His *Persuasive to Moderation*. 4. His *Good Advice to the Church of England, Roman Catholic, and Protestant dissenter*. 5. The *Sandy Foundation shaken*. 6. *No Cross, no Crown*. 7. The great *Cafe of Liberty of Conscience debated*. 8. The *Christian Quaker* and his *Testimony stated and vindicated*. 9. A *Discourse of the general Rule of Faith and Practice, and Judge of Controversy*. 10. *England's Present Interest considered*. 11. An *Address to Protestants*. 12. His *Reflections and Maxims*. 13. His *Advice to his Children*. 14. His *Rise and Progress of the People called Quakers*. 15. A *Treatise on Oaths*. Most of these have passed several editions, some of them many. The letters between William Penn and Dr Tilletson, and William Penn and William Popple, Esq; together with Penn's letters to the princess Elizabeth of the Rhine and the countess of Hornes, as also one to his wife on his going to Pennsylvania, are inserted in his works, which were first collected and published in 2 vols folio; and the parts since selected and abridged into 1 vol. folio, are very much and deservedly admired for the good sense they contain.

PENNI (Giovanni Francisco), born at Florence in 1488, was the disciple of Raphael, who observing his genius and integrity, intrusted his domestic concerns entirely to his management; by which means he got the appellation of *il fattore*, or the "steward," which he retained ever after. The genius of Penni was universal; but his greatest pleasure was in painting landscapes and buildings: he was an excellent designer, and coloured extremely well in oil, distemper, and fresco. He painted portraits in an exquisite style, and had such happy natural talents, that Raphael left him heir to his fortune in partnership with Julio Romano his fellow-disciple. After Raphael's death, Penni painted many pictures at Rome, particularly in the palace of Chigi, so exactly in the style of his master, that they might not undervalued have been imputed to him: he finished, in conjunction with Julio and Pierino del Vago, the

celebrated designs of the battles of Constantine, and others, which Raphael had left imperfect; but differing with them about a copy of the transfiguration, which the pope intended for the king of France, they separated. Penni went to Naples; but the air of that country disagreeing with his constitution, he died soon after in 1528. He had a brother called *Lucca Penni*, who worked at Genoa and other parts of Italy in conjunction with Pierino del Vago, who married his sister; he went thence to England, where he worked for Henry VIII. and for several merchants; was employed by Francis I. at Fontainebleau; but at last quitted the pencil, and devoted himself to engraving.

PENNY, or PENY, in commerce, an ancient English coin, which had formerly considerable course; but is now generally dwindled into an imaginary money, or money of account. Camden derives the word from the Latin *pecunia*, "money."

The ancient English penny, penig, or pening, was the first silver coin struck in England; nay, and the only one current among our Saxon ancestors: as is agreed by Camden, Spelman, Dr Hicks, &c.

The penny was equal in weight to our three-pence; five of them made one shilling, or feikings Saxon; 30 a mark or mancuse, equal to our 7s. 6d.

Till the time of king Edw. I. the penny was struck with a cross, so deeply indented in it that it might be easily broke, and parted, on occasion, into two parts, thence called *half-pennies*; or into four, thence called *fourthings*, or *farthings*.—But that prince coined it without indenture; in lieu of which, he first struck round half-pence and farthings.

He also reduced the weight of the penny to a standard; ordering that it should weigh 32 grains of wheat, taken out of the middle of the ear.—This penny was called the *penny sterling*.—Twenty of these pence were to weigh an ounce; whence the penny became a weight as well as a coin. See *STERLING* and *PENNY-Weight*.

The penny sterling is now nigh disused as a coin; and scarce subsists, but as a money of account, containing the 12th part of a shilling, or the 140th part of a pound.

PENNY, in ancient statutes, &c. is used for all silver money.

And hence the *ward-penny*, *aver-penny*, *hundred-penny*, *tithing-penny*, and *brothal-penny*.

PENNY-Weight, a Troy weight, containing 24 grains; each grain weighing a grain of wheat gathered out of the middle of the ear, well dried. The name took its rise hence, that this was anciently the weight of one of our ancient silver pennies. See *PENNY*.

Twenty of these penny-weights make an ounce Troy. PENRITH, an ancient town of the county of Cumberland in England, seated under a hill called *Penrith-Fell*, near the rivers Eimont and Lowther. It is a great thoroughfare for travellers; but has little other trade except tanning, and a small manufacture of checks. Formerly it had a castle, but it is now in ruins. In the church-yard is a monument of great antiquity, consisting of two stone-pillars 11 feet 6 inches high, and five in circumference in the lower part, which is rounded; the upper is square, and tapers to a point; in the square part is some fret-work, and the relieve of a cross; and on the interior side of one is the faint representation of some animal. Both these stones are mortified at their

Penny.
Penrith.

Penryn lower part into a round one: they are about 15 feet
 afinder, and the space between them is inclosed on each
 side with two very large but thin semicircular stones; ^{Peninsylvania}
 so that there is left between pillar and pillar a walk of
 two feet in breadth. Two of these lesser stones are
 plain, the others have certain figures, at present scarce
 intelligible. Not far from these pillars is another called
 the *giant's thumb*, five feet eight inches high, with
 an expanded head, perforated on both sides; from the
 middle the stone rises again into a lesser head, rounded
 at top; but no part has a tendency to the figure of
 a cross, being in no part mutilated. W. Long. 3. 16.
 N. Lat. 54. 35.

PENRYN, a town of Cornwall in England, seated
 on a creek of Falmouth-haven. It consists of about 300
 houses, and the streets are broad and paved. It sends
 two members to parliament. W. Long. 5. 35. N. Lat.
 50. 23.

PENSACOLA, a settlement in North America,
 situated at the mouth of a river on the gulf of Mexico.
 It was established by the French, and ceded to Great
 Britain in 1763; but has lately been taken by the Spaniards.
 W. Long. 87. 20. N. Lat. 30. 22.

PENSILVANIA, one of the principal British colonies
 in North America, had its name from the famous Quaker William Penn, son of Sir William, commander
 of the English fleet in Oliver Cromwell's time, and in the beginning of Ch. II.'s reign, who obtained a
 grant of it in the year 1679; is bounded on the east by
 Delaware bay and river, and the Atlantic ocean; on
 the north by the country of the Iroquois, or five nations;
 and on the south and west by Maryland. Its extent,
 from north to south, is about 200 miles; but its breadth
 varies greatly, from 15, and even less, to near 200.

The air in Pensylvania is sweet and clear. The
 fall, or autumn, begins about the 20th of October,
 and lasts till the beginning of December, when the
 winter sets in, which continues till March, and is
 sometimes extremely cold and severe; but the air is
 then generally dry and healthy. The river Delaware,
 though very broad, is often frozen over. From
 March to June, that is, in the spring, the weather is
 more inconstant than in the other seasons. In the
 months of July, August, and September, the heats
 would be almost intolerable, if they were not mitigated
 by frequent cool breezes. The wind, during the
 summer, is generally south-west; but in the winter
 blows for the most part from the north-west, over the
 snowy frozen mountains and lakes of Canada, which
 occasions the excessive cold during that season.

As to the face of this country, towards the coast,
 like the adjacent colonies, it is flat, but rises gradually
 to the Apalachian mountains on the west.

The chief rivers are three, Delaware, Sasquahanna,
 and Skookil. The Delaware, rising in the country
 of the Iroquois, takes its course southward; and
 after dividing this province from that of New Jersey,
 falls into the Atlantic ocean between the promontories
 or capes May and Henlopen, forming at its mouth a
 large bay, called, from the river, *Delaware Bay*.
 This river is navigable above 200 miles. The Sasquahanna
 rises also in the country of the Iroquois, and running
 south through the middle of the province, falls into
 the bay of Chesapeake, being navigable a great way
 for large ships. The Skookil has its source

in the same country as the other two, and also runs
 south, almost parallel to them; till at length turning
 to the eastward, it falls into the Delaware at the city
 of Philadelphia. It is navigable for boats above 100
 miles. These rivers, with the numerous creeks and
 harbours in Delaware bay, capable of containing the
 largest fleets, are extremely favourable to the trade of
 this province.

As to the soil, produce, and traffic of Pensylvania,
 we refer the reader to what has been said on these
 heads under New-York and the JERSEYS, which is
 equally applicable to this province; and if there is any
 difference, it is on the side of this province. They
 have some rice here, but no great quantities; and some
 tobacco, but it is not equal to that of Virginia. From
 the premiums offered by the society of arts in London,
 it appears that the soil and climate of this province are
 looked upon as proper for the cultivation of some species
 of vines. The trade carried on from hence and the
 other colonies to the French and Dutch islands and
 Surinam, was greatly to the disadvantage of Britain,
 and very destructive to the sugar-colonies: for they
 take molasses, rum, and other spirits, with a great
 many European goods, from these foreigners; carrying
 them horses, provisions, and lumber in return, without
 which the French could not carry on their sugar-manufactures
 to that advantage they do.

New-York, the Jerseys, and Pensylvania, were discovered,
 with the rest of the continent of North America, in
 the reign of Henry VII. by Sebastian Cabot, for the crown
 of England; but Sir Walter Raleigh was the first adventurer
 that attempted to plant colonies on these shores, in the
 reign of Queen Elizabeth; and, in honour of that princess,
 gave all the eastern coast of North America the name of
Virginia. Mr Hudson, an Englishman, sailing to that
 part of the coast which lies between Virginia and New
 England, in the beginning of the reign of James I. and
 being about to make a settlement at the mouth of Hudson's
 river, the Dutch gave him a sum of money to dispose
 of his interest in this country to them. In the year
 1608 they began to plant it; and, by virtue of this
 purchase, laid claim to all those countries which are
 now denominated *New York*, *New Jersey*, and *Pensylvania*;
 but there remaining some part of this coast which was
 not planted by the Hollanders, the Swedes sent a fleet
 of ships thither, and took possession of it for that crown;
 but the Dutch having a superior force in the neighbourhood,
 compelled the Swedes to submit to their dominion,
 allowing them, however, to enjoy the plantations they
 had settled. The English not admitting that either the
 Dutch or Swedes had any right to countries first
 discovered and planted by a subject of England, and
 part of them at that time possessed by the subjects
 of Great Britain, under charter from Queen Elizabeth
 and king James I. king Charles II. during the first
 Dutch war in 1664, granted the countries of New York,
 the Jerseys, and Pensylvania, of which the Dutch
 had usurped the possession, to his brother James
 Duke of York; and Sir Robert Carr being sent over
 with a squadron of men of war and land-forces,
 and summoning the Dutch governor of the city
 of New Amsterdam, now New York, to surrender,
 he thought fit to obey the summons, and yield that
 capital to the English: the rest of the places in the
 possession of the Dutch and Swedes followed.

Pennsylvania, followed his example; and these countries were confirmed to the English by the Dutch at the next treaty of peace between the two nations. The Duke of York afterwards parcelled them out to under proprietors; selling, in particular, to William Penn the elder, in 1683, the town of Newcastle, *alias* Delaware, and a district of twelve miles round the same; to whom, his heirs and assigns, by another deed of the same date, he made over all that tract of land from 12 miles south of Newcastle to the Whore-hills, otherwise called *Cape Henlopen*, now divided into the two counties of Kent and Suffex, which, with Newcastle district, are commonly known by the name of the *Three Lower counties upon Delaware River*. All the rest of the under-proprietors, some time after, surrendered their charters to the crown; whereby New York and the Jerseys became Royal governments; but Penn retained that part of the country which had been sold him by the Duke of York, together with what had been granted to him before in 1680-1, which now constitutes the province of Pennsylvania. As soon as Penn had got his patent, he began to plant the country. Those who went over from England were generally dissenters and quakers, whose religion is established by law here, but with a toleration of all other protestant sects. The Dutch and Swedes, who were settled here before Mr Penn became proprietor, choosing still to reside in this country, as they did in New York and the Jerseys, obtained the same privileges as the rest of his majesty's subjects; and their descendants are now in a manner the same people with the English, speaking their language, and being governed by their laws and customs. Mr Penn, however, not satisfied with the title granted him by king Charles II. and his brother, bought the lands also of the Indians for a valuable consideration, or what they esteemed such, (though 20 miles were purchased, at first, for less than an acre about Philadelphia would pay now), paying them in cloth, tools, and utensils, to their entire satisfaction; for they had not hands to cultivate the hundredth part of their lands, and if they could have raised a product, there was nobody to buy; the purchase, therefore, was all clear gain to them; and, by the coming of the English, their peltry trade became so profitable, that they soon found their condition much altered for the better; and are now as well clothed and fed as the European peasantry in many places.

Pennsylvania is one of the most flourishing colonies in North America, having never had any quarrel with the natives. Whenever they desire to extend their settlements, they purchase new lands of the sachems, never taking any by force; but the Indians now set a very high price upon their lands, in comparison of what they did at first, and will hardly part with them at any rate. In an estimate of the proprietary estate of the province, published above thirty years ago, we find, that the proprietaries, who alone can purchase lands here from the natives, had bought seven millions of acres for no more than 75*l*. Sterling, which the proprietaries afterwards sold at the rate of 1*l*. for every 100 acres. The Indian council at Onandago, however, disapproved of their deputies parting with so much land; and, in the year 1755, obliged the proprietaries to re-convey great part of the same to the Indians.

A dispute subsisted a long time between the proprietaries of this province and Lord Baltimore, proprietary of Maryland, about the right to certain lands; which was at last amicably adjusted, though greatly in favour of the Penns.

About the year 1704 there happened some alteration in the constitution of the province. The establishment that took place, and subsisted till the present troubles broke out, consisted of a governor, council, and assembly, each with much the same power and privileges as in the neighbouring colony of New York. The lieutenant-governor and council were appointed by the proprietors Thomas and Richard Penn, with his majesty's approbation; but if the laws enacted here were not repealed within six months after they had been presented to the king for his approbation or disallowance, they were not repealable by the crown after that time.

Pennsylvania is divided into seven counties; four of which are called the *Upper*, and three the *Lower*. Of the upper, viz. Buckingham, Philadelphia, Chester, and Lancaster, the three first are the lands included in king Charles II's grant, and designed *Pennsylvania*; the lower, viz. those of Newcastle, Kent, and Suffex, were called *Nova Belgia* before the duke of York sold them, as we observed above, to Mr Penn. The upper counties end at Marcus Hook, four miles below Chester Town, where the lower begin, and run along the coast near 100 miles. Each of these counties had a sheriff, with a quarterly and monthly session, and assizes twice a year.

PENSION, a sum of money paid annually for services or considerations already past. The yearly payment of each member to the houses of the ins of courts are likewise named *pensions*; and the yearly assembly of the society of Gray's Inn, to consult on the affairs of the house, is also called a *pension*.

PENSIONARY, or PENSIONER, a person who has an appointment, or yearly sum, payable during life, by way of acknowledgment, charged on the estate of a prince, company, or particular person.

Grand PENSIONARY, an appellation given to the first minister of the States of Holland. The grand pensionary is chairman in the assemblies of the states of that province: he proposes the matters to be consulted on; collects the votes; forms and pronounces the resolutions of the states; opens letters; confers with foreign ministers, &c. His business is also to inspect the finances, to maintain the authority of the states, and to see that the laws are observed; and he is perpetual deputy of the states-general of the United Provinces. His commission is, however, given him only for five years; after which it is deliberated whether or no it shall be renewed; but there is no instance of its being revoked; therefore death only puts an end to the functions of this important minister.

PENSIONARY, is also the first minister of the regency of each city in Holland. His office is to give his advice in affairs relating to the government, either of the state in general, or of the city in particular; and in assemblies of the states of the province, he is speaker in behalf of his city. The function, however, of these pensionaries is not every where alike; in some cities they only give their advice, and are never found in assemblies of the magistrates, except when expressly called

Pensioner called thither: in others they attend constantly; and in others they make the propositions on the part of the burgo-masters, draw up their conclusions, &c. They are called *pensionaries*, because they receive an appointment or pension.

Pentagraph

PENSIONER, in general, denotes a person who receives a pension, yearly salary, or allowance. Hence, *The Band of Gentlemen-PENSIONERS*, the noblest sort of guard to the king's person, consists of 40 gentlemen, who receive a yearly pension of 100 l.

This honourable band was first instituted by king Henry VIII. and their office is to attend the king's person, with their battle-axes, to and from his chapel-royal, and to receive him in the presence-chamber, or coming out of his privy-lodgings: they are also to attend at all great solemnities, as coronations, at St George's feast, public audiences of ambassadors, at the sovereign's going to parliament, &c.

They are each obliged to keep three double horses and a servant, and so are properly a troop of horse. They wait half at a time quarterly; but on Christmas-day, Easter-day, Whitunday, &c. and on extraordinary occasions, they are all obliged to give their attendance. They have likewise the honour to carry up the sovereign's dinner on the coronation-day and St George's feast; at which times the king or queen usually confer the honour of knighthood on two such gentlemen of the band as their captain presents.

Their arms are gilt battle-axes; and their weapons, on horse-back, in time of war, are cuirassiers-arms, with sword and pistols. Their standard in time of war is, argent, a cross gules. Their captain is always a nobleman, who has under him a lieutenant, a standard-bearer, a clerk of the check, secretary, paymaster, and harbinger.

PENSTOCK, a sluice or flood-gate, serving to retain or let go at pleasure the water of a mill-pound, or the like.

PENTACROSTIC, in poetry, a set of verses so disposed, as that there are always five acrostics of the same name, in five divisions of each verse. See **ACROSTIC**.

PENTEDROSTYLA, in natural history, the name of a genus of spars. See **SPAR**. The bodies of this genus are spars in form of Pentagonal columns, terminated by pentangular pyramids at one end, and regularly affixed at the other to some solid body.

PENTAGON, in geometry, a figure of five sides and five angles. See **GEOMETRY**.

In fortification, pentagon denotes a fort with five bastions.

PENTAGRAPH, an instrument designed for drawing figures in what proportion you please, without any skill in the art.

It consists of four bras or wooden rulers, two of them from 15 to 18 inches long, and the other two half that length. At the ends and middle of the long rulers, as also at the ends of the shorter, are holes, upon the exact fixing of which the perfection of the instrument chiefly depends. Those in the middle of the long rulers are to be at the same distance from those at the ends of the long ones, and those of the short ones so as to form a parallelogram. It is fitted together by a large pillar *a*, having at one end a screw and nut, whereby the long rulers are joined, and at the

other a little knot for the instrument to slide on: *b* is a rivet with a screw and nut, wherewith each short ruler is fastened to the middle of each long one; *c* is a pillar, one end whereof being hollowed into a screw, has a nut fitted to it; at the other end is a worm to screw into the table when the instrument is to be used; it joins the ends of the two short rulers: *d* is a pen or pencil screwed into a little pillar: *e* is a brads point moderately blunt, screwed likewise into a little pillar.

Use of the Pentagraph. 1. To copy a design in the same scale as the original. Screw the worm *c* into the table; lay a paper under the pencil *d* now placed at *f*, and the design under the point *e* now placed at *g*; then conducting the point over the several lines of the design, the pencil *f* will draw the same on the paper. 2. If the design is to be reduced into a half, &c. the worm must be placed at the end of the long ruler *d*, and the paper and pencil in the middle. In this situation conduct the brads point as before, and the pencil will draw its copy in the proportion required, the pencil here moving through half the length that the point does. On the contrary, if the design is to be enlarged one half, the brads point, with the design, must be placed in the middle at *c*, the pencil and paper at the end of the long ruler, and the worm at the other.

2. To enlarge and reduce in other proportions, there are holes drilled at equal distances on each ruler; namely, all along the short ones, and half-way up the long ones, for placing of the brads point, pencil, and worm, in a right line therein; that is, if the piece carrying the point be put in the third hole, the two other pieces must be put in its third hole. If then the point and design be placed at any hole of the short ruler, which forms the angle therewith, the copy will be less than half the original. On the contrary, if it be placed at one of the holes of that short ruler which is parallel to the long ruler, the copy will be greater than half the original. Few of these instruments will do any thing but straight lines, and many of them not even those.

PENTAMETER, in ancient poetry, a kind of verse, consisting of five feet, or metres, whence the name. The two first feet may be either dactyls or spondees at pleasure; the third is always a spondee; and the two last anapests: such is the following verse of Ovid.

1 2 3 4 5
Carminibus vixit tempus in omne meis.

A pentameter verse subjoined to an hexameter, constitutes what is called *elegiac*. See **ELEGIAC**.

PENTANDRIA, (from πέντε, "five," and ἀνρ, "a man or husband"); the name of the fifth class in Linnaeus's sexual method, consisting of plants which have hermaphrodite flowers, with five stamens or male organs. See **BOTANY**, p. 1296.

PENTAPOLIS, (Wisdom x.) the five cities of the plain in Palestine, all destroyed by fire from heaven, except Zoar.

PENTAPOLIS, (Ptolemy); a district of Cyrenaica situate on the Mediterranean; denominated from its five cities; namely, *Berenice*, *Arfinoe*, *Ptolemais*, *Cyrene*, and *Apollonia*.

PENTAPOLIS of the *Philistines*, (Josephus); taking name

Pentagraph
Plate
CCXXXIV

Pentapolis name from five principal cities, Gaza, Gath, Ascalon, Azotus, and Ekron.

PENTAPOLIS, (Herodotus); five cities of Doris, a district of the Hither Asia; namely, Camirus, Cnidus, Cos, Jalyfus, and Lindus, (Scholiast on Theocritus).

PENTAPETALOUS, an appellation given to flowers, which consist of five petals or leaves.

PENTAPETES, in botany, a genus of the decandria order, belonging to the monodelphia class of plants. There is but one species known in the gardens of this country, viz. the phenicia, with halbert-pointed, spear-shaped, sawed leaves. It is an annual plant, a native of India, and rises to the height of two or three feet; adorned with fine scarlet flowers, consisting of one petal cut into five segments. In the centre of the flower arises a short thick column, to which adhere 15 short filamina. It is a tender plant, and must be brought up in the hot-house.

PENTATEUCH, an appellation given to the first five books of the Old Testament, viz. Genesis, Exodus, Leviticus, Numbers, and Deuteronomy.

PENTATHLON, in antiquity, a general name for the five exercises performed at the Grecian games, viz. wrestling, boxing, leaping, running, and playing at the discus.

PENTECOST, a solemn festival of the Jews; so called because it was celebrated on the 50th day after the 16th of the month Nisan, which was the second day of the passover. See PASSOVER.

The feast of Pentecost was instituted in memory of the law's being given on the 50th day after the Israelites came out of Egypt. It was on the feast of Pentecost that the Holy Ghost miraculously descended on the apostles. See WHITSUNDAY.

PENTHESILEA, queen of the Amazons, succeeded Orythia, and gave proofs of her courage at the siege of Troy, where she was killed by Achilles. Pliny says that she invented the battle-ax.

PENULTIMA, or PENULTIMATE *Syllable*, in grammar, denotes the last syllable but one of a word; and hence the antipenultimate syllable is the last but two, or that immediately before the penultima.

PENUMBRA, in astronomy, a partial shade observed between the perfect shadow and the full light in an eclipse. It arises from the magnitude of the sun's body; for were he only a luminous point, the shadow would be all perfect; but, by reason of the diameter of the sun, it happens, that a place which is not illuminated by the whole body of the sun, does yet receive rays from a part thereof.

PEPIN DE HERISTAL, or LE GROS, mayor of the palace under Clovis III. Childbert, and Dagobert. The power of these mayors in France was so great, that they left the sovereign only the empty title, and in the end seized on the throne itself.

PEPIN *le Bref*, or *le Petit*, grandson to Pepin le Gros, and first king of the second race of French monarchs, was mayor of the palace to Childeric III. a weak prince: he contrived to confine him and his son Thierry in different monasteries; and then, with the assistance of Pope Stephen III. he usurped the sovereign power. He died in 768, aged 54.

PEPPER, PIPER, in natural history, an aromatic berry of a hot dry quality, chiefly used in season-

ing. We have three kinds of pepper at present used in the shops, the black, the white, and the long pepper.

Black pepper is the fruit of the piper, and is brought from the Dutch settlements in the East Indies. See PIPER.

The common white pepper is factitious, being prepared from the black in the following manner: they steep this in sea-water, exposed to the heat of the sun for several days, till the rind or outer bark loosens; they then take it out, and, when it is half dry, rub it till the rind falls off; then they dry the white fruit, and the remains of the rind blow away like chaff. A great deal of the heat of the pepper is taken off by this process, so that the white kind is more fit for many purposes than the black. However, there is a sort of native white pepper produced on a species of the same plant; which is much better than the factitious, and indeed little inferior to the black.

The long pepper is a dried fruit, of an inch or an inch and an half in length, and about the thickness of a large goose-quill: it is of a brownish grey colour, cylindrical in figure, and said to be produced on a plant of the same genus.

Pepper is principally used by us in food, to assist digestion; but the people in the East-Indies esteem it as a stomachic, and drink a strong infusion of it in water by way of giving them an appetite: they have also a way of making a fiery spirit of fermented fresh pepper, with water which they use for the same purposes. They have also a way of preserving the common and long pepper in vinegar, and eating them afterwards at meals.

Jamaica PEPPER, or Pimento. See PIMENTO.

PEPPER-Mint. See MENTHA.

PEPPER-Water, a liquor prepared in the following manner, for microscopical observations: put common black pepper, grossly powdered, into an open vessel so as to cover the bottom of it half an inch thick, and put to it rain or river-water, till it covers it an inch; shake or stir the whole well together at the first mixing, but never disturb it afterwards: let the vessel be exposed to the air uncovered; and in a few days there will be seen a pellicle or thin skin swimming on the surface of the liquor, looking of several colours.

This is a congeries of multitudes of small animals; and being examined by the microscope, will be seen all in motion: the animals, at first light, are so small as not to be distinguishable, unless to the greatest magnifiers; but they grow daily till they arrive at their full size. Their numbers are also continually increasing, till the whole surface of the liquor is full of them, to a considerable depth. When disturbed, they will sometimes all dart down to the bottom; but they soon after come up to the surface again. The skin appears soonest in warm weather, and the animals grow the quickest; but in the severest cold it will succeed, unless the water freezes.

About the quantity of a pin's head of this foam, taken up on the nib of a new pen, or the tip of a hair-pencil, is to be laid on a plate of clear glass; and if applied first to the third magnifier, then to the second, and finally to the first, will shew the different animalcules it contains, of several kinds and shapes as well as sizes.

PERA, one of the suburbs of Constantinople, where

Perambulator, where ambassadors and Christians usually reside. See *CONSTANTINOPLE*.

PERAMBULATOR, in surveying, an instrument for measuring distances, called also *pedometer*, *way-wisef*, and *surveying wheel*.

Plate CCI.
fig. 11.

It consists of a wheel AA, two feet seven inches and a half in diameter; consequently half a pole, or eight feet three inches in circumference. On one end of the axis is a nut, three quarters of an inch in diameter, and divided into eight teeth; which, upon moving the wheel round, fall into the eight teeth of another nut c, fixed on one end of an iron-rod Q, and thus turn the rod once round in the time the wheel makes one revolution. This rod, lying along a groove in the side of the carriage of the instrument, under the dotted line, has at its other end a square hole, into which is fitted the end b of a small cylinder P. This cylinder is disposed under the dial-plate of a movement, at the end of the carriage B, in such a manner as to be moveable about its axis: its end a is cut into a perpetual screw, which falling into the 32 teeth of a wheel perpendicular thereto, upon driving the instrument forward, that wheel makes a revolution each 16th pole. On the axis of this wheel is a pinion with six teeth, which, falling into the teeth of another wheel of 60 teeth, carries it round every 160th pole, or half a mile.

This last wheel, carrying a hand or index round with it over the divisions of a dial-plate, whose outer limb is divided into 160 parts, corresponding to the 160 poles, points out the number of poles passed over. Again, on the axis of this last wheel is a pinion, containing 20 teeth, which falling into the teeth of a third wheel which hath 40 teeth, drives it once round in 320 poles, or a mile. On the axis of this wheel is a pinion of 12 teeth, which, falling into the teeth of a fourth wheel having 72 teeth, drives it once round in 12 miles.

This fourth wheel, carrying another index over the inner limb of the dial-plate, divided into 12 for miles, and each mile subdivided into halves, quarters, and furlongs, serves to register the revolutions of the other hand, and to keep account of the half miles and miles passed over as far as 12 miles.

The use of this instrument is obvious from its construction. Its proper office is in the surveying of roads and large distances, where a great deal of expedition, and not much accuracy, is required. It is evident, that driving it along and observing the hands, has the same effect as dragging the chain and taking account of the chains and links.

Its advantages are its hardness and expedition; its contrivance is such, that it may be fitted to the wheel of a coach, in which plate it performs its office, and measures the road without any trouble at all.

PERCA, the *РЕРКА*; a genus of fishes belonging to the order of thoracici. The head is furnished with scaly and serrated opercula; there are seven rays in the membrane of the gills; and the fins on the back are prickly. There are 38 species, principally distinguished by peculiarities in the back-fin. The most remarkable are,

1. The *fluviatilis*, or common perch, hath a deep body, very rough scales, and the back much arched. The colours are beautiful; the back and part of the

sides being of a deep green, marked with five broad black bars pointing downwards; the belly is white, tinged with red; the ventral fins of a fine scarlet; the anal fins and tail of the same colour, but rather paler. In a lake called *Llyn Raitthlyn*, in Merionethshire in Wales, is a very singular variety of this fish: the back part is quite hunched, and the lower part of the backbone next the tail strangely distorted: in colour and other respects it resembles the common perch, which are as numerous in this lake as the deformed fish. They are not peculiar to this water; for Linnaeus takes notice of them in a lake at Fahlun in his country. It is said that they are also met with in the Thames near Marlow.

The perch was much esteemed as food by the Romans, nor is it less admired at present as a firm and delicate fish; and the Dutch are particularly fond of it when made into a dish called *water-fouchy*. It is a gregarious fish, and loves deep holes and gentle streams; is exceedingly voracious, and an eager biter: if the angler meets with a shoal of them, he is sure of taking every one.—It is a common notion that the pike will not attack this fish, on account of the spiny fins which the perch erects on its approach. This may be true of large fish; but it is well known that small perches are the most tempting bait which can be laid for the pike. The perch is very tenacious of life, and has been known to survive a journey of 60 miles in dry straw. It seldom grows to a large size, though Mr Pennant mentions one that weighed nine pounds; but this, he tells us, is very uncommon.

2. The *labrax*, or *basse*, is a very voracious, strong, and active fish. Ovid calls them *rapidi lupi*, a name continued to them by after-writers; and they are said to grow to the weight of fifteen pounds. The irides are silvery; the mouth large; the teeth are situated in the jaws, and are very small; in the roof of the mouth is a triangular rough space, and just at the gullet are two others of a roundish form. The scales are of a middling size, are very thick set, and adhere closely. The body is formed somewhat like that of a salmon. The colour of the back is dusky, tinged with blue. The belly white. In young fish the space above the side line is marked with small black spots.—It is esteemed a very delicate fish.

3. The *perca marina*, or sea-perch, is about a foot long; the head large and deformed; eyes great; teeth small and numerous. On the head and covers of the gills are strong spines. The colour red, with a black spot on the covers of the gills, and some transverse dusky lines on the sides. It is a fish held in some esteem at the table.

4. The *cernua*, or *ruffe*, is found in several of the English streams: it is gregarious, assembling in large shoals, and keeping in the deepest part of the water. It is of a much more slender form than the perch, and seldom exceeds six inches in length. The teeth are very small, and disposed in rows. It has only one dorsal fin, extending along the greatest part of the back: the first rays, like those of the perch, are strong, sharp, and spiny; the others soft. The body is covered with rough compact scales. The back and sides are of a dirty green, the last inclining to yellow, but both spotted with black. The dorsal fin is spotted with black; the tail marked with transverse bars.

Perception, 5. The nilotica, or perch of the Nile, is taken about
 Perceptive. Cairo. The flesh has a sweet and exquisite flavour,
 and is not hard, but very white. It is one of the best
 fishes of the Nile; and as it is of the largest size in
 Egypt, it adorns a table if brought upon it entire and
 well-fried.

PERCEPTION, in logic, the first and most simple
 act of the mind, whereby it perceives, or is conscious
 of its ideas. See LOGIC, Part I. and METAPHYSICS,
 n° 36—39. 77.

PERCEPTIVE faculty of the human mind.—Concerning this there have been very great controversies. Every one knows that there are sensations arising in our minds; but the question is what it is that perceives them, whether it is a man as a compound being of soul and body, or whether the living percipient is not a mind, or spirit alone, without a body, or else a quality only, resulting from the construction of a body without any distinct or separate spirit annexed thereto. These are difficulties probably never to be demonstrated, and we must at last be content with a probable proof only.

Man is so wonderfully made, that he seems to assign a place to every one of his sensations, and yet reason and experience tell him, that in truth they cannot exist, or be, where he is apt too hastily to judge, or suppose them to be; for as nothing can act where it is not, so the perceptive power of man cannot possibly perceive any thing without or beyond himself. It is generally agreed, that the secondary qualities of body (as they are called) do not exist external to the man, but only the primary ones; though Dr Berkeley attempted to shew that they both exist together, and that where-ever the colour was, there likewise was the extension. If this could be satisfactorily made to appear, the doctor's system would stand good for the non-existence of every thing but spirit and ideas; but it cannot, and to confine the argument to one sense alone, to wit, sight; that man perceives colour we are sure of, and therefore it must be within him, or he would act where he was not. Now if he perceived extension, that must likewise be within him too, but then he could perceive no extension larger than himself:—but as neither extension nor colour have any place assigned them in the body, surely it is not the body, or any conformation thereof, that perceives. We may then suppose that it is something else, which is joined with the body that is the percipient, which let us name *mind* or *soul*; this mind should seem to be one simple uncompounded being, otherwise it could not be conscious that successive perceptions were the affections of the same thing.

Colour, though hastily judged to be without the mind, Berkeley and Malbranche have sufficiently shewed not to be so; and that extension is so, seems also true; because it perceives none of its sensations extended, but only assigns or fixes a place for them, these of colour in particular, external to the man, although in fact they may not be without him; and this place is only determined by an operation of the mind, suggesting or supposing distance, from an experimental obstruction to the motion of some members of the body by which the touch is affected as well as the sight, and so both the tangible and visible object concluded, though too precipitately, to be in one and the same

place where the obstruction is likewise judged to be, Perceptive. and hence it obtained the supposition or suggestion of distance; and as we have no sensations to which we do not ascribe some distance or place, there must be place or space existing, or it could not be supposed. And therefore as nothing is perceived or suggested but what is supposed in some place, so nothing can exist but what constitutes space, or is in it, and must have some extension.

But then the mind of man surely cannot be extended beyond his body, though it often supposes an extension far beyond; and if the extension imagined was in the mind, and not a mere operation thereof, by way of supposition, it could not guess so much amiss about the extension of objects which has not been familiar to the other organs of sense, as we often find it does; for it seems to be a vulgar error to entertain a notion of the mind's judging of any distance or magnitudes from any pictures conjectured to be in the fund of the eye, or in itself: in the former case, if there be any picture in the bottom of the eye, it would judge every object in an inverse position to the body, which is contrary to experience; neither does the mind judge of any magnitude according to any such pictures, but of the real external magnitudes; and seldom errs much, unless the objects be very remote.—If the bulk of objects were judged of by the pictures in the eye, a flea or mite must judge every object very small to what a man does, because the picture will be diminished nearly as the eye is less: indeed these insects may see distinctly smaller things than man, because the objects may be brought nearer their small eyes, without throwing the focus of the rays beyond the retina, as the same distance of object would do in a larger eye, and prevent distinct vision; and it is highly probable, that these small insects cannot see objects at a great distance, unless they are much larger than what a man can see at the like distance; but then what they do see they judge to be of the same bigness that a man does; and so must every creature, let its eyes be of what dimension or number you please. It is a vague notion opticians have, who imagine that one, like a microscope lens, will magnify the picture on the retina, whereas just the contrary takes place; for when the eye is used alone, without such a lens, the shorter focus of the eye forms the picture, and the longer is at the object; but when a lens is used by way of a microscope, the object is in the shorter, and the picture at the longer focus, just contrary to the method of common vision.

So, again, if the mind was conscious of a picture in the eye, it would perceive as many objects the creature had eyes; whereas it judges of no more, let the number of eyes be as they will, than it does by the help of any other of the senses.

From all which we may conclude, that figure, extension, and motion, are not perceptible objects; but that sensations alone are such, the former being only imagined, by an operation of the mind, to exist external to it; and that if they did not so exist, the mind could not imagine any extension, figure, and motion; for there never is found any of them perceivable by it, nor any figure or motion attending a simple sensation. Indeed it is too commonly thought,

Perch
Perfect.

that there is a shape perceived with colour, or a coloured shape; but no object appears of one simple colour to a fixed eye, but every part of the object exhibits a different degree of colour; and these degrees separate sensations, to which the mind ascribes a place, though, in fact, the colour is not in the place so judged of, but something else that gives resistance to the actions of the mind on the body; and from hence it supposes there must be something existing there which gives rise to the colour perceived by it.—It is impossible the mind should perceive the images of things within itself, unless it was equally extended with the things themselves; and if not, how can it be thought that an ideal world can exist within the mind, as some philosophers have conjectured? Surely it cannot be; but it must be only imagination that directs as to the external existence of real things. We cannot properly be said to imagine what does not or has not really existed; for let a blind man try if he can imagine colour, or a deaf man found, and he will find himself at a loss. Father Malbranche indeed tells us, that a man may have an idea of a golden mountain that never existed; and a man may recollect the figure of a mountain which he has formerly imagined, and remember the colour of gold which he lately had a perception of, and suppose it possible they may be connected, and call this operation of his mind an idea if he pleases; but, after all his efforts, if he should happen to think of a mountain as large as Shooter's hill, he will hardly allow it to be contained in his mind.

PERCH, in land-measuring, a rod or pole of $16\frac{1}{2}$ foot in length, of which 40 in length and 4 in breadth make an acre of ground. *Crompt. Jurisd.* 222. But, by the customs of several counties, there is a difference in this measure. In Staffordshire it is 24 foot; and in the forest of Sherwood 25 foot; the foot being there 18 inches long; and in Herefordshire a perch of ditching is 21 feet, the perch of walling $16\frac{1}{2}$ feet, and a pole of denshired ground is 12 feet, &c. *Skene.*

PERCHE, a territory of Orlannois in France, 35 miles long, and 30 broad; bounded on the north by Normandy; on the south, by Maine and Dunois; on the east, by Beauce; and on the west, by Maine. It takes its name from a forest, and is pretty fertile. The inhabitants carry on a pretty good trade; and the principal town is Belleme.

PERCOLATION, the same with FILTRATION. See CHEMISTRY, n° 69.

PERCUSSION, in mechanics, the impression a body makes in falling or striking upon another; or the shock of two bodies in motion.

PERDIX. See TETRAO.

PEREASLAW, a strong populous town of Poland, in the palatinate of Kiovia, situated on the river Tribecz; in E. Long. 32. 44. N. Lat. 49. 46.

PERENNIALS, or PERENNIAL FLOWERS, in botany, a term applied to those plants whose roots will abide many years, whether they retain their leaves in winter or not. Those which retain their leaves are called *evergreens*; but such as cast their leaves are named *deciduous*, or *perditols*.

PERFECT, something to which nothing is wanting, or that has all the requisites of its nature and kind.

PERFECT Cadence, in MUSIC. See CADENCE.

PERFECT *Tenses*, in grammar. See PRETERITE. Perfect. Pergamum.

PERFECT.

PERFECTION, the state or quality of a thing

PERFECTION is divided, according to Chauvinus, into

physical, moral, and metaphysical.

Physical or natural perfection, is that whereby a thing has all its powers and faculties, and those too in full vigour; and all its parts both principal and secondary, and those in their due proportion, constitution, &c. in which sense man is said to be perfect when he has a found mind in a found body. This perfection is by the schools frequently termed *εμπειρία*, because a thing is enabled thereby to perform all its operations.

Moral perfection is an eminent degree of virtue or moral goodness, to which men arrive by repeated acts of piety, beneficence, &c. This is usually subdivided into absolute or inherent, which is actually in him to whom we attribute it; in imputative, which exists in some other, and not in him it is attributed to.

Metaphysical, transcendental, or essential perfection, is the possession of all the essential attributes, or of all the parts necessary to the integrity of a substance; or it is that whereby a thing has or is provided of every thing belonging to its nature. This is either absolute, where all imperfection is excluded, such is the perfection of God; or *secundum quid*, and in its kind.

PERFORANS MANUS.

PERFORANS *Pedis*.

PERFORATUS MANUS.

PERFORATUS *Pedis*.

} See ANATOMY, Table
of the Muscles.

PERFUME, denotes either the volatile effluvia from any body affecting the organ of smelling, or the substance emitting those effluvia; in which last sense the word is most commonly used. The generality of perfumes are made up of musk, ambergris, civet, rose and cedar woods, orange-flowers, jessamines, jonquils, tuberoses, and other odoriferous flowers. Those drugs commonly called aromatics, such as storax, frankincense, benzoin, cloves, mace, &c. enter the composition of a perfume; some are also composed of aromatic herbs or leaves, as lavender, marjoram, sage, thyme, hyssop, &c.

Perfumes were anciently very much in use; but, since people are become sensible of the harm they do to the head, they are generally disused among us; however, they are still common in Spain and Italy.

PERGAMA, (Virgil), the citadel of Troy; which, because of its extraordinary height, gave name to all high buildings, (Servius). Others say the walls of Troy were called *Pergama*.

PERGAMUM, (Pliny); called also *Pergamea*, (Virgil); *Pergamia*, (Plutarch); a town of Crete, built by Agamemnon in memory of his victory, (Velleius). Here was the burying-place of Lycurgus, (Aristoxenus, quoted by Plutarch). It was situate near Cydonia, (Servius); to what point not said: but Scylax helps him out, who places the Daërynean temple of Diana, which stood near Cydonia, (Strabo), to the north of the territory of Pergamia.—Another PERGAMUM, (Pliny, Strabo); a town of Mylia, situate on the Caicus, which runs by it. It was the royal residence of Eumenes, and of the kings of the Attali, (Livy). There an ancient temple of Æsculapian.

Pergamus. Iapetus flood; an asylum, (Tacitus). The ornament of Pergamum was the royal library, vying with that of Alexandria in Egypt; the kings of Pergamum and Egypt rivaling each other in this respect, (Pliny). Strabo ascribes this rivalry to Eumenes. Plutarch reckons up 200,000 volumes in the library at Pergamum. Here the *membrance pergamenæ*, whence the name *parchment*, were invented for the use of books, (Varro, quoted by Pliny). The country of Galen, and of Orisbasius chief physician to Julian the Apostate, (Eunapius), called by some the *ape of Galen*. Here P. Scipio died, (Cicero). Attalus son of Eumenes dying without issue, bequeathed his kingdom to the Roman people, who reduced it to a province, (Strabo). *Pergameus*, the epithet, (Martial). Here was one of the nine *consensus juridici*, or assemblies of the *Asia Romana*, called *Pergameus*, and the ninth in order, (Pliny); which he also calls *iurisdiclio Pergamena*.

PERGAMUS, an ancient kingdom of Asia, formed out of the ruins of the empire of Alexander the Great. It commenced about the year 283. The first sovereign was Philetærus, an eunuch, by birth a Paphlagonian, of a mean descent, and in his youth a menial servant to Antigonus one of Alexander's captains. He afterwards served Lyfimachus king of Macedon and Thrace, who appointed him keeper of his treasures lodged in Pergamus. While he held this employment, having fallen under the displeasure of Ariinœ wife to Lyfimachus, he found means to make a quarrel between him and his master; upon which Philetærus seized on the castle of Pergamus, together with the treasures entrusted to his care, amounting to 90,000 talents. At first he offered his service, together with his treasure, to Seleucus king of Syria; but both Seleucus and Lyfimachus dying soon after, he kept possession of the town and treasure all till his death; which happened 20 years after his revolt from Lyfimachus.

Philetærus left the city of Pergamus to his brother, or, according to some, to his brother's son Eumenes I.; and he, laying hold of the opportunity offered by the dissensions among the Seleucidæ, possessed himself of many strong-holds in the province of Asia; and having hired a body of Galatians, defeated Antiochus, as he was returning from a victory gained over his brother Seleucus Callinicus. By this victory he obtained possession of the greater part of Asia; however, he did not long enjoy his acquisitions; for he died next year of immoderate drinking, a vice to which he was greatly addicted.

Eumenes was succeeded by Attalus I. nephew of Philetærus, and the first who took upon him the title of king of Pergamus. He defeated the Gauls, who were desirous of settling in his territory; and, according to Livy, was the first of the Asiatic princes who refused to pay a contribution to these barbarians. When Seleucus Ceraunus was engaged in other wars, he invaded his territories, and conquered all the provinces on this side of Mount Taurus; but was soon driven out of his new acquisitions by Seleucus and his grandfather Achæus, who entering into an alliance against him, deprived him of all his newly acquired territories, and even besieged him in his capital. Upon this Attalus invited to his assistance the Gauls who had

settled in Thrace; and with their help not only obliged the enemy to raise the siege of Pergamus, but quickly recovered all the provinces he had lost. After this he invaded Ionia and the neighbouring provinces, where several cities voluntarily submitted to him. The Teians, Colophonians, with the inhabitants of Egea and Lemnos, sent deputies declaring themselves ready to acknowledge him for their sovereign; the Carlienes, on the other side the river Lycus, opened their gates to him, having first expelled the governor set over them by Achæus. From thence he advanced to Apia, and encamping on the banks of the river Megisthus, received homage from the neighbouring nations. But here the Gauls, being frightened by an eclipse of the moon, refused to proceed farther; which obliged Attalus to return to the Hellespont, where he allowed his allies to settle, giving them a large and fruitful territory, and promising that he would always assist and protect them to the utmost of his power.

Attalus having thus settled his affairs with equal honour and advantage to himself, entered into an alliance with Rome, and afterwards joined them in their war against Philip king of Macedon. Here he had the command of the Rhodian fleet; with which he not only drove the Macedonians quite out of the seas, but having landed his men, he, in conjunction with the Athenians, invaded Macedon, and obliged Philip to raise the siege of Athens, which he had greatly distressed; for which services the Athenians not only heaped on him all the favours they could, but called one of their tribes by his name; an honour they had never bestowed on any foreigner before.

Attalus, not contented with all he had yet done against Philip, attempted to form a general confederacy of the Greeks against him. But while he was haranguing the Boeotians to this purpose, and exhorting them with great vehemence to enter into an alliance with the Romans against their common enemy, he fell down speechless. However, he came to himself again, and desired to be carried by sea from Thebes to Pergamus, where he died soon after his arrival, in the 72d year of his age and 43d of his reign.

This prince was a man of great generosity, and such an enthusiast in learning and learned men, that he caused a grammarian, named *Daphidas*, to be thrown into the sea from the top of a high rock, because he spoke disrespectfully of Homer.

Attalus was succeeded by his eldest son Eumenes II. He was exceedingly attached to the Romans, inasmuch that he refused the daughter of Antiochus the Great in marriage, lest he should thus have been led into a difference with that people. He also gave notice to the Roman senate of the transactions of Ariarathes king of Cappadocia, who was making great preparations both by sea and land. Nor did Eumenes stop here; for when he saw the war about to break out between Antiochus and the Romans, he sent his brother Attalus to Rome to give information of the proceedings of Antiochus. The senate heaped honours both on Eumenes and his brother; and in the war which followed, gave the command of their fleet to the king of Pergamus in conjunction with C. Livius Salinator. The victory gained on this occasion was in a great measure owing to Eumenes, who boarded some of the enemy's

Pergamus. ships in person, and during the whole action behaved with uncommon bravery. Some time afterwards Eumenes, entering the territories of Antiochus with a body of 5000 men, ravaged all the country about Thyatira, and returned with an immense booty. But in the mean time Antiochus invading Pergamus in his turn, ravaged the whole country, and even laid siege to the capital. Attalus, the king's brother held out with a handful of men till the Achæans, who were in alliance with Eumenes, sent 1000 foot and 100 horse to his assistance. As this small body of auxiliaries were all chosen men, and commanded by an experienced officer, they behaved with such bravery that the Syrians were obliged to raise the siege. At the battle of Magnesia, too, Eumenes behaved with the greatest bravery; not only sustaining the first attack of the enemy's elephants, but driving them back again on their own troops, which put the ranks in disorder, and gave the Romans an opportunity of giving them a total defeat by attacking them opportunely with their horse. In consequence of this defeat, Antiochus was obliged to conclude a peace with the Romans on such terms as they pleased to prescribe; one of which was, that he should pay Eumenes 400 talents, and a quantity of corn, in recompence for the damage he had done him.

Eumenes now thought of obtaining some reward from the Romans equivalent to the services he had done them. Having gone to Rome, he told the senate, that he was come to beg of them that the Greek cities which had belonged to Antiochus before the commencement of the late war, might now be added to his dominions; but his demand was warmly opposed by the ambassadors from Rhodes, as well as by deputies from all the Greek cities in Asia. The senate, however, after hearing both parties, decided the matter in favour of Eumenes, adding to his dominions all the countries on this side of Mount Taurus which belonged to Antiochus; the other provinces lying between that mountain and the river Mæander, excepting Lycia and Caria, were bestowed on the Rhodians. All the cities, which had paid tribute to Attalus, were ordered to pay the same to Eumenes; but such as had been tributary to Antiochus were declared free.

Soon after this Eumenes was engaged in a war with Prusias king of Bithynia, who made war upon him by the advice of Hannibal the celebrated Carthaginian general. But Eumenes, being assisted by the Romans, defeated Prusias in an engagement by sea, and another by land; which so disheartened him, that he was ready to accept of peace on any terms. However, before the treaty was concluded, Hannibal found means to draw Philip of Macedon into the confederacy, who sent Philocrates, an old and experienced officer, with a considerable body of troops to join Prusias. Hereupon Eumenes sent his brother Attalus to Rome with a golden crown, worth 15,000 talents, to complain of Prusias for making war on the allies of the Roman people without any provocation. The senate accepted the present, and promised to adjust every thing to the satisfaction of their friend Eumenes, whom they looked upon to be the most steady ally they had in Asia. But in the mean time Prusias, having ventured another sea-fight, by a contrivance of Hannibal's, gained a complete victory. The Carthaginian commander ad-

vised him to fill a great many earthen vessels with various kinds of serpents and other poisonous reptiles, and in the heat of the fight to throw them into the enemies ships so as to break the pots and let the serpents loose. All the soldiers and seamen were commanded to attack the ship in which Eumenes was, and only to defend themselves as well as they could against the rest; and that they might be in no danger of mistaking the ship, an herald was sent before the engagement with a letter to the king. As soon as the two fleets drew near, all the ships of Prusias, singling out that of Eumenes, discharged such a quantity of serpents into it, that neither soldiers nor sailors could do their duty, but were forced to fly to the shore, lest they should fall into the enemy's hands. The other ships, after a faint resistance, followed the king's example, and were all driven ashore with great slaughter; the soldiers being no less annoyed by the stings of the serpents, than by the weapons of the enemy. The greatest part of the ships of Eumenes were burnt, several taken, and the others so much shattered, that they became quite unserviceable. The same year Prusias gained two remarkable victories over Eumenes by land, both of which were entirely owing to stratagems of Hannibal. But, while matters were thus going on to the disadvantage of Eumenes, the Romans interfered, and by their deputies not only put an end to the differences between the two kings, but prevailed on Prusias to betray Hannibal; upon which he poisoned himself, as hath been related under the article HANNIBAL.

Eumenes, being thus freed from such a dangerous enemy, engaged in a new war with the kings of Capadocia and Pontus, in which also he proved victorious. His friendship for the Romans he carried to such a degree of enthusiasm, that he went in person to Rome to inform them of the machinations of Perseus king of Macedon. He had before quarrelled with the Rhodians, who sent ambassadors to Rome to complain of him. But as the ambassadors happened to arrive while the king himself was present in the city, the Rhodian ambassadors could not obtain any hearing, and Eumenes was dismissed with new marks of favour. This journey, however, had almost proved fatal to him; for, on his return, as he was going to perform a sacrifice at Delphi, two assassins, sent by Perseus, rolled down two great stones upon him as he entered the straits of the mountains. With one he was dangerously wounded on the head, and with the other on the shoulder. He fell with the blows from a steep place, and thus received many other bruises; so that he was carried on board his ship when it could not well be known whether he was dead or alive. His people, however, soon finding that he was still alive, conveyed him to Corinth, and from Corinth to Ægina, having caused their vessels to be carried over the Isthmus.

Eumenes remained at Ægina till his wounds were cured, which was done with such secrecy, that a report of his death was spread all over Asia, and even believed at Rome; nay, his brother Attalus was so convinced of the truth of this report, that he not only assumed the government, but even married Stratonice the wife of Eumenes. But in a short time Eumenes convinced them both of his being alive, by returning
to

^{Pergamus.} to his kingdom. On the receipt of this news Attalus resigned the sovereignty in great haste, and went to meet his brother; carrying an halberd, as one of his guards. Eumenes received both him and the queen with great tenderness, nor did he ever say any thing which might tend to make them uneasy; only it is said he whispered in his brother's ear when he first saw him, "Be in no haste to marry my wife again till you are sure that I am dead."

The king being now more than ever exasperated against Perfes, joined the Romans in their war against Perfes; but during the course of it he suddenly cooled in his affection towards those allies whom he had hitherto served with so much zeal, and that to such a degree, that he admitted ambassadors from Perfes, and offered to stand neuter if he would pay him 1000 talents, and for 1500, to influence the Romans to grant him a safe and honourable peace. But these negotiations were broke off without effect, by reason of the distrust which the two kings had of one another. Eumenes could not trust Perfes unless he paid him the money beforehand; while, on the other hand, Perfes did not care to part with the money before Eumenes had performed what he promised; neither could he be induced to pay the sum in question, though the king of Pergamus offered to give hostages for the performance of his promise. What the reason of such a sudden change in the disposition of Eumenes was, is nowhere told; however, the fact is certain. The negotiations above-mentioned were concealed from the Romans as long as possible; however, they soon came to be known, after which the republic began to entertain no small jealousy of their old friend, and therefore heaped favours on his brother Attalus, without taking any notice of the king himself. Eumenes had sent him to Rome to congratulate the senate on the happy issue of the war with Perfes, not thinking that his practices had been discovered. However, the senate, without taking any notice of their disaffection to Eumenes at first, entertained Attalus with the greatest magnificence; then several of the senators who visited him proceeded to acquaint him with their suspicions of the king, and desired Attalus to treat with them in his own name, assuring him, that the kingdom of Pergamus would be granted him, if he demanded it, by the senate. These speeches had at first some effect; but Attalus, being of an honest disposition, and assisted by the advice of a physician called *Stratius*, a man of great probity, resolved not to comply with their desire. When he was admitted to the senate, therefore, he first congratulated them on the happy issue of the Macedonian war, then modestly recounted his own services; and lastly, acquainted them with the motive of his journey; intreating them to send ambassadors to the Gauls, who by their authority might secure his brother from any danger of their hostilities; and he requested them also, that the two cities of *Ænus* and *Maronea* might be bestowed on himself. The senate, imagining that Attalus designed to choose some other day to sue for his brother's kingdom, not only granted all his requests, but sent him richer and more magnificent presents than they had ever done before. Upon this Attalus immediately set out on his return to Pergamus; which so provoked the senators, that they declared the cities free which they had promised to

Attalus; thus rendering ineffectual their promise which ^{Pergamus.} they were ashamed openly to revoke; and as for the Gauls, who were on all occasions ready to invade the kingdom of Pergamus, they sent ambassadors to them, with instructions to behave in such a manner as would rather tend to encourage them in their design than disavow them from it.

Eumenes, being alarmed at those proceedings, resolved to go in person to Rome, in order to justify himself. But the senate, having already condemned him in their own minds, resolved not to hear his vindication. For this reason, as soon as they heard of his design, they made an act that no king should be permitted to enter the gates of Rome. Eumenes, however, who knew nothing of this act, set forward on his journey, and landed at Brundisium; but, no sooner did the Roman senate get intelligence of his arrival there, than they sent a messenger acquainting him with the decree of the senate; and telling him at the same time, that if he had any business to transact with the senate, he was appointed to hear it and transmit it to them; but if not, that the king must leave Italy without delay. To this Eumenes replied, that he had no business of any consequence to transact, and that he did not stand in need of any of their assistance; and without saying a word more, went on board his ship, and returned to Pergamus.

On his return home, the Gauls, being encouraged by the cold reception which he had met with at Rome, invaded his territories, but were repulsed with great loss by the king, who afterwards invaded the dominions of Prusias, and possessed himself of several cities. This produced new complaints at Rome; and Eumenes was accused, not only by the ambassadors of Prusias, but also by those of the Gauls and many cities in Asia, of keeping a secret correspondence with Perfes king of Macedonia. This last charge was confirmed by some letters which the Romans themselves had intercepted; so that Eumenes found it impossible to keep up his credit any longer at Rome, though he sent his brothers Athenæus and Attalus thither to intercede for him. The senators, in short, had conceived the most implacable hatred against him, and seemed absolutely bent on his destruction, when he died, in the 39th year of his reign, leaving his kingdom and his wife to his brother Attalus. He left one son, but he was an infant, and incapable of governing the kingdom; for which reason Eumenes chose rather to give the present possession of the crown to his brother, reserving the succession to his son, than to endanger the whole by committing the management of affairs to his son's tutors.

Attalus, in the beginning of his reign, found himself greatly distressed by Prusias king of Bithynia, who not only overthrew him in a pitched battle, but advanced to the very walls of Pergamus, ravaging the country as he marched along; and at last saved the royal city itself. The king, however, saved himself by a timely flight, and dispatched ambassadors to Rome, complaining of the bad usage of Prusias. The latter endeavoured to defend himself, and to throw the blame on Attalus. But, after a proper inquiry was made into the matter, Prusias was found to be entirely in the wrong; in consequence of which, he was at last obliged to conclude a peace with his adversary on the following

Pergamini. lowing terms. 1. That he should immediately deliver up to Attalus 20 ships with decks. 2. That he should pay 500 talents to Attalus within the space of 20 years. 3. That he should pay 100 talents to some of the other Asiatic nations by way of reparation for the damages they had sustained from him. And, 4. Both parties should be content with what they had before the beginning of the war.

Some time after this, Prusias having made an unnatural attempt on the life of his son Nicomedes, the latter rebelled, and, with the assistance of Attalus, drove his father from the throne, and, as is said, even murdered him in the temple of Jupiter. The Romans took no notice of these transactions, but shewed the same kindness to Attalus as formerly. The last enterprise in which we find Attalus engaged, was against Andriens the pretended son of Perseus king of Macedon, where he assisted the Romans; after which he gave himself up entirely to ease and luxury, committing state affairs entirely to his ministers; and thus continued to his death, which happened in the 82d year of his age, about 138 B. C.

Attalus II. was succeeded by Attalus III. the son of Eumenes; for the late king, considering that he only held the crown as a trust for his nephew, passed by his own children in order to give to it him, tho' he appears to have been by no means worthy of it. He is said to have been deprived of his senses thro' the violence of his grief for his mother's death; and indeed, throughout his whole reign, he behaved more like a madman than any thing else. Many of his subjects of the highest quality were cut off with their wives and children, upon the most groundless suspicions; and for these executions he made use of mercenaries hired out from among the most barbarous nations. Thus he proceeded till he had cut off all the best men in the kingdom; after which he fell into a deep melancholy, imagining that the ghosts of those whom he had murdered were perpetually haunting him. On this he shut himself up in his palace, put on a mean apparel, let his hair and beard grow, and sequestered himself from all mankind. At last he withdrew from the palace, and retired into a garden, which he cultivated with his own hands, and filled with all sorts of poisonous herbs. These he used to mix with wholesome pulse, and send packets of them to such as he suspected. At last, being weary of this amusement, and living in solitude, because nobody durst approach him, he took it in his head to follow the trade of a founder, and make a brazen monument. But, while he laboured at melting and casting the brass, the heat of the sun and furnace threw him into a fever, which in seven days put an end to his tyranny, after he had sat on the throne five years.

On the death of the king, a will was found, by which he left the Roman people heirs of all his goods; upon which they seized on the kingdom, and reduced it to a province of their empire by the name of *Asia Proper*. But Aristonicus, a son of Eumenes by an Ephesian courtesan, reckoning himself the lawful heir to the crown, could by no means be satisfied with this usurpation of the Romans, and therefore assembled a considerable army to maintain his pretensions. The people in general, having been accustomed to a monarchy, dreaded a republican form of government; in

consequence of which, they assisted Aristonicus, and soon put him in a condition to reduce the whole kingdom. The news, however, were soon carried to Rome, and Licinius Crassus, the pontifex maximus, was sent into the east, with orders to enforce obedience to the king's will. Historians take no notice of any forces which were sent along with this commander; whence it is supposed, that he depended on assistance from the Asiatics, who were in alliance with Rome, or from the Egyptians. But when he came thither, he found both the Syrians and Egyptians so reduced, that he could not expect any assistance from them. However, he was soon supplied with troops in plenty by the kings of Pontus, Bithynia, Cappadocia, and Paphlagonia; but managed matters so ill, that he was entirely defeated and taken prisoner. Those who took him designed to carry him to Aristonicus; but he, not able to endure the disgrace, would have laid violent hands on himself if he had not been disarmed. However, being allowed to keep a rod for managing the horse on which he sat, he struck a Thracian soldier who stood near him so violently with it, that he beat out one of his eyes; upon which the other drew his sword, and run him thro' on the spot. His head was brought to Aristonicus, who exposed it to public view; but the body was honourably buried.

Aristonicus had no great time to enjoy the fruits of his victory. Indeed he behaved very improperly after it; for, instead of preparing to oppose the next army, which he might have been assured the Romans would send against him, he spent his time in feasting and revelling. But he was soon roused out of his lethargy by Perpenna the new consul, who having assembled with incredible expedition the troops of the allies, came unexpectedly upon him, obliged him to venture an engagement at a disadvantage, and entirely defeated him. Aristonicus fled to a city called *Stratonice*; but was so closely pursued by the conqueror, that the garrison, having no method of supplying themselves with provisions, delivered up their leader, as well as a philosopher named *Blosius*, who had been the companion and counsellor of Aristonicus. The philosopher behaved with great resolution after being taken, and openly defended his siding with Aristonicus, because he thought his cause just. He exhorted the latter to prevent the disgrace and misery of captivity by a voluntary death; but Aristonicus, looking upon death as a greater misery than any captivity, suffered himself to be treated as his conquerors pleased.

In the mean time, a new consul, named *Manius Aquilius*, being arrived from Rome, sent a most haughty message to Perpenna, requiring him immediately to deliver up Aristonicus as a captive belonging to his triumph when the war should be ended. With this demand Perpenna refused to comply, and his refusal had almost produced a civil war. However, this was prevented by the death of Perpenna, which happened soon after the dispute commenced. The Pergameneans, notwithstanding the defeat and captivity of their leader, still held out with such obstinacy, that Aquilius was obliged to besiege, and take by force almost every city in the kingdom. In doing this, he took a very effectual, though exceeding cruel method. Most of the cities in the kingdom had no other water than what was brought from a considerable distance in aqueducts.

Periander
Perichor-
pium.

aqueducts. These Aquilids did not demolish, but poisoned the water, which produced the greatest abhorrence of him throughout all the east. At last, however, the whole country being reduced, Aquilids triumphed, the unhappy Aristonicus was led in chains before his chariot, and probably ended his miserable life in a dungeon. The country remained subject to the Romans while their empire lasted, but is now in the hands of the Turks. The city is half ruined, and is known by the name of *Pergamus*. It is inhabited by about 3000 Turks, and a few families of poor Christians. E. Long. 27. 27. N. Lat. 30. 3.

PERIANDER, tyrant of Corinth and Corcyra, was reckoned among the seven wise men of Greece; though he might rather have been reckoned among the most wicked men, since he changed the government of his country, deprived his countrymen of their liberty, usurped the sovereignty, and committed the most shocking crimes. In the beginning of his reign he behaved with mildness; but after his having sent to the tyrant of Syracuse to consult him on the safest method of government, he abandoned himself to cruelty. The latter, having heard Periander's envoys, took them into a field, and, instead of answering them, pulled up before them the ears of corn which exceeded the rest in height. Periander, on being told of this action, understood what was meant by it. He first secured himself by a good guard, and then put the most powerful Corinthians to death. He abandoned himself to the most enormous crimes; committed incest with his mother, kicked to death his wife Melissa, daughter of Procles king of Epidaurus, notwithstanding her being with child; and was so enraged at Lycophron, his second son, for lamenting his mother's death, that he banished him into the island of Corcyra. Yet he passed for one of the greatest politicians of his time; and Heracles tells us, that he forbade voluptuousness; that he imposed no taxes, contenting himself with the custom arising from the sale and the import and export of commodities; that, though wicked himself, he hated the wicked, and caused all pimps to be drowned; lastly, that he established a senate, and settled the expence of its members. He died 585 B. C.

PERIAGOGUE, in rhetoric, is used where many things are accumulated into one period which might have been divided into several.

PERIANTHIUM, (from *περί*, "round," and *ἄνθος*, "the flower,") the flower-cup properly so called, the most common species of calix, placed immediately under the flower, which is contained in it as in a cup. See **BOTANY**, p. 1296.

PERICARDIUM, in anatomy, a membranous bag filled with water, which contains the heart in man and many other animals. It is formed by a duplication of the mediastinum, or membrane which divides the thorax into two unequal parts. See **ANATOMY**, n° 382, 305, 386.

PERICARPIMUM, (from *περί*, "round," and *καρπός*, "fruit,") the seed-vessel; an entrail of the plant big with seeds, which it discharges when ripe. The seed-vessel is in fact the developed seed-bud, and may very properly be compared to the fecundated ovary in animals; for it does not exist till after the fertilizing of the seeds by the male-dust, and the con-

sequent fall of the flower. All plants, however, are not furnished with a seed-vessel; in such as are deprived of it, the receptacle or calix performs its functions by inclosing the seeds, as in a matrix, and accompanying them to perfect maturity.

PERICHORUS, in antiquity, a name given by the Greeks to their profane games or combats, that is, to such as were not consecrated to any of the gods.

PERICLES, was one of the greatest men that ever flourished in Greece. He was educated with all imaginable care; and beside other masters, he had for his tutors Zeno, Eleates, and Anaxagoras. He learned from the last of these to fear the gods without superstition, and to account for an eclipse from a natural cause. Many were unjust enough to suspect him of atheism, because he had perfectly studied the doctrine of that philosopher. He was a man of undoubted courage; and of such extraordinary eloquence, supported and improved by knowledge, that he gained almost as great an authority under a republican government as if he had been a monarch; but yet he could not escape the satirical strokes of the comic poets. His dissoluteness with the women was one of the vices with which he was chiefly charged. He died the third year of the Peloponnesian war, after long sickness, which had weakened his understanding. Aspasia, Pericles's favourite, was a learned woman of Miletus: she taught Socrates rhetoric and politics. As Pericles cared not much for his wife, he willingly gave her up to another, and married Aspasia, whom he passionately loved.

PERICRANIUM, in anatomy, a thick solid coat or membrane, covering the outside of the cranium or skull. See **ANATOMY**, n° 4.

PERIGEE, in astronomy, that point of the sun or moon's orbit wherein they are at the least distance from the earth, in which sense it stands opposed to apogee.

PERIGRAPHE, a word usually understood to express a careless or inaccurate delineation of any thing; but in Vesalius it is used to express the white lines or impressions that appear on the musculus rectus of the abdomen.

PERIGUEUX, an ancient episcopal town of France, capital of the province of Perigord, seated on the river Isle, in E. Long. o. 33. N. Lat. 45. 18. It is remarkable for the ruins of the temple of Venus, and an amphitheatre.

PERIGORD, a province of France, which makes part of Guienne, bounded on the north by Angoumois, and a part of Marche, and on the east by Quercy and Limousin; on the south, by Agenois and Bazadais; and on the west, by Bourleudois, Angoumois, and a part of Saintonge. It is about 83 miles in length, and 60 in breadth. It abounds in iron mines, and the air is pure and healthy. Perigueux is the capital town.

PERIHELIIUM, in astronomy, that part of a planet or comet's orbit wherein it is in its least distance from the sun, in which sense it stands in opposition to aphelium.

PERIMETER, in geometry, the bounds or limits of any figure or body. The perimeters of surfaces or figures are lines; those of bodies are surfaces. In circular

Perichorus
Perimeter.

Perineum
Period.

P E R

[5952]

P E R

Period
Periploca.

cular figures, instead of perimeter, we say circumference, or periphery.

PERINEUM, or PERINEUM, in anatomy, the space between the anus and the parts of generation, divided into two equal lateral divisions by a very distinct line, which is longer in males than in females.

PERINKSKIÖLD (John), a learned Swedish writer, born at Stregnesia in Sudermania, in 1754, studied under his father, who was professor of eloquence and poetry, and afterwards became well skilled in the antiquities of the North. He was made professor at Upsal, secretary antiquary of the king of Sweden, and counsellor of the chancery of antiquities. He died in 1720. His principal works are: 1. A history of the kings of Norway. 2. A history of the kings of the North. 3. An edition of John Meffenius on the kings of Sweden, Denmark, and Norway, in 14 vols folio, &c. All Peringskiöld's works are excellent, and highly esteemed.

PERIOD, in astronomy, the time taken up by a star or planet in making a revolution round the sun; or the duration of its course till it return to the same part of its orbit.

The periodical times of the planets round the sun are as follow:

The period of	seconds.	min.	hrs.	days.
Mercury - - -	87	23	15	53
Venus - - -	224	16	49	24
The earth - - -	365	6	9	14
Mars - - -	686	23	27	30
Jupiter - - -	4332	12	20	25
Saturn - - -	10759	6	36	26

There is a wonderful harmony between the distances of the planets from the sun, and their periods round him; the great law whereof is, that the squares of the periodical times of the primary planet, are to each other as the cubes of their distances from the sun: and likewise, the squares of the periodical times of the secondaries of any planet are to each other as the cubes of their distances from that primary. This harmony among the planets is one of the greatest confirmations of the Copernican hypothesis. See ASTRONOMY, n° 132.

For the periods of the moon, see ASTRONOMY, n° 223.

The periods of several comets are now pretty well ascertained. See ASTRONOMY, n° 46 *et seq.*

PERIOD, in chronology, denotes a revolution of a certain number of years, or a series of years, whereby, in different nations, and on different occasions, time is measured; such are the following.

Calippic PERIOD, a system of seventy-six years. See CALIPPIC.

Dionysian PERIOD, or Victorian Period, a system of 532 lune-solar and Julian years; which being elapsed, the characters of the moon fall again upon the same day and feria, and revolve in the same order, according to the opinion of the ancients.

This period is otherwise called the *great paschal cycle*, because the Christian church first used it to find the true time of the pascha or easter. The sum of these years arise by multiplying together the cycles of the year and moon. See ASTRONOMY, n° 308.

Hipparchus's PERIOD, a system of 304 years, both

lunar and solar; which being elapsed, Hipparchus thought that the reckoning by the lunar motion would coincide again with the solar measures. This period comprehends 3760 lunar months, or 111,039 days; the sum of which arises from the multiplication of the Calippic period by 4, subtracting unity from the product.

Julian PERIOD. See JULIAN.

PERIOD, in grammar, denotes a small compass of discourse, containing a perfect sentence, and distinguished at the end by a point, or full stop, thus (.); and in members or divisions marked by commas, colons, &c.

PERIOD, in oratory. See there, n° 44.

PERIODIC, or PERIODICAL, something that terminates and comprehends a period; such is a periodic month; being the space of time wherein the moon dispatches her period.

PERIOECI, *περιοικοι*, in geography, such inhabitants of the earth as have the same latitudes, but opposite longitudes, or live under the same parallel and the same meridian, but in different semicircles of that meridian, or in opposite points of the parallel. These have the same common seasons throughout the year, and the same phenomena of the heavenly bodies; but when it is noonday with the one it is midnight with the other, there being twelve hours in an east and west direction. These are found on the globe by the hour-index, or by turning the globe half round, that is, 180 degrees either way.

PERIOSTEUM, or PERIOSTEUM, in anatomy, a nervous vascular membrane, endued with a very quick sense, immediately surrounding, in every part, both the internal and external surfaces of all the bones in the body, excepting only so much of the teeth as stand above the gums, and the peculiar places on the bones, in which the muscles are inserted. It is hence divided into the external and internal periosteum; and where it externally surrounds the bones of the skull, it is generally called the *pericranium*. See ANATOMY, n° 4.

PERIPATETIC PHILOSOPHY, that system taught and established by Aristotle, and maintained by his followers the Peripatetics, called also the *Aristotelians*. See the next article.

PERIPATUS, (anc. geog.) the place where Aristotle taught; a part of the Lyceum, a gymnasium at Athens, situate on the banks of the Ilissus. The reason of the appellation is, that Aristotle walked as he taught, (Cicero, Diogenes Laertius). *Peripatetici* the name of the sect or followers of Aristotle.

PERIPETIA, in the drama, that part of a tragedy wherein the action is turned, the plot unravelled, and the whole concludes. See CATASTROPHE.

PERIPHERY, in geometry, the circumference of a circle, ellipse, or any other regular curvilinear figure.

PERIPLOCA, Virginian silk, a genus of the digynia order, belonging to the pentandria class of plants. There are four species, all of them natives of warm climates. They are perennial shrubby plants with turning branches, rising from three to 40 feet high, adorned with white and purple flowers. The seeds are inclosed in capsules filled with a soft down. Two of the species, viz. the *Græca* and *Africana*, will live in the open air in this country, and are propagated by layers;

Perfell
Perjury.

layers; but the others are tender, so require to be kept in a flow.

PERISCII, in geography, the inhabitants of either frigid zone, between the polar circles and the poles, where the sun, when in the summer signs, moves only round about them, without setting; and consequently their shadows in the same day turn to all the points of the horizon.

PERISTALTIC, a vermicular spontaneous motion of the intestines, performed by the contraction of the circular and longitudinal fibres of which the fleshy coats of the intestines are composed; by means whereof the chyle is driven into the orifices of the lacteal veins, and the feces are protruded towards the anus.

PERISTYLE, in ancient architecture, a building encompassed with a row of columns on the inside.

PERITONEUM, in anatomy, is a thin, smooth, and lubricous membrane, investing the whole internal surface of the abdomen, and containing most of the viscera of that part as it were in a bag. See ANATOMY, n° 350.

PERTROCHIUM, in mechanics, denotes a wheel, or circle, concentric with the base of a cylinder, and moveable together with it about its axis. See MECHANICS.

PERJURY, in law, is defined by Sir Edward Coke to be a crime committed when a lawful oath is administered, in some judicial proceeding, to a person who swears wilfully, absolutely, and falsely, in a matter material to the issue or point in question. Thelaw takes no notice of any perjury but such as is committed in some court of justice having power to administer an oath; or before some magistrate or proper officer invested with a similar authority, in some proceedings relative to a civil suit or a criminal prosecution: for it esteems all other oaths unnecessary at least, and therefore will not punish the breach of them. For which reason it is much to be questioned, how far any magistrate is justifiable in taking a voluntary affidavit in any extrajudicial matter, as is now too frequent upon every petty occasion; since it is more than possible that, by such idle oaths, a man may frequently, *in foro conscientie*, incur the guilt, and at the same time evade the temporal penalties of perjury. The perjury must also be corrupt, (that is, committed *malò animò*), wilful, positive, and absolute; not upon surprise, or the like: it also must be in some point material to the question in dispute; for if it only be in some trifling collateral circumstance, to which no regard is paid, it is no more penal than in the voluntary extrajudicial oaths before-mentioned. Subornation of perjury is the offence of procuring another to take such a false oath, as constitutes perjury in the principal. The punishment of perjury and subornation, at common law, has been various. It was anciently death; afterwards banishment, or cutting out the tongue; then forfeiture of goods; and now it is fine and imprisonment, and never more to be capable of bearing testimony. But the statute 5 Eliz. c. 9. (if the offender be prosecuted thereon) inflicts the penalty of perpetual infamy, and a fine of 40 l. on the suborner; and in default of payment, imprisonment for six months, and to stand with both ears nailed to the pillory. Perjury itself is thereby punished with six months imprisonment, perpetual

Perjury
Permutation.

infamy, and a fine of 20 l. or to have both ears nailed to the pillory. But the prosecution is usually carried on for the offence at common law; especially as, to the penalties before inflicted, the statute 2 Geo. II. c. 25. superadds a power for the court to order the offender to be sent to the house of correction for a term not exceeding seven years, or to be transported for the same period; and makes it felony, without benefit of clergy, to return or escape within the time. It has sometimes been wished, that perjury, at least upon capital accusations, whereby another's life has been or might have been destroyed, was also rendered capital, upon a principle of retaliation; as it is universally by the laws of France. And certainly the odiousness of the crime pleads strongly in behalf of the French law. But it is to be considered, that there they admit witnesses to be heard only on the side of the prosecution, and use the rack to extort a confession from the accused. In such a constitution, therefore, it is necessary to throw the dread of capital punishment into the other scale, in order to keep in awe the witnesses for the crown; on whom alone the prisoner's fate depends: so naturally does one cruel law beget another. But corporal and pecuniary punishments, exile and perpetual infamy, are more suited to the genius of the English law; where the fact is openly discussed between witnesses on both sides, and the evidence for the crown may be contradicted and disproved by those of the prisoner. Where indeed the death of an innocent person has actually been the consequence of such wilful perjury, it falls within the guilt of deliberate murder, and deserves an equal punishment; which our ancient law in fact inflicted. But the mere attempt to destroy life by other means not being capital, there is no reason that an attempt by perjury should; much less that this crime should, in all judicial cases, be punished with death. For to multiply capital punishments lessens their effect, when applied to crimes of the deepest dye; and, detestable as perjury is, it is not by any means to be compared with some other offences, for which only death can be inflicted; and therefore it seems already (except perhaps in the instance of deliberate murder by perjury) very properly punished by our present law; which has adopted the opinion of Cicero, derived from the law of the twelve tables, *Perjurii pena diuina, exitium; humana, dedecus*.

PERIPNEUMONY, an inflammation of the lungs. See MEDICINE, n° 289, 290. and FARRIERY, § 5.

PERIZONIUS (James), a very learned and laborious writer, was born at Dam in 1651. He became professor of history and eloquence at the university of Franeker, when, by his merit and learning, he made that university flourish. However, in 1693, he went to Leyden, where he was made professor of history, eloquence, and the Greek tongue; in which employment he continued till his death, which happened in 1715. He wrote many Dissertations, and other learned and curious works, particularly *Origines Babylonica et Egyptiaca*, 2 vols 8vo, &c.

PERMEABLE, a term applied to bodies of so loose a texture as to let something pass through them.

PERMUTATION, in commerce, the same with bartering. In the canon-law, permutation denotes

- PERMSKI** the actual exchange of one beneficence for another.
- PERMIA**, or **PERMIA**, a town of the Russian empire, and capital of a province of the same name, seated on the river Kama between the Dwina and the Ob; E. Long. 55. 50. N. Lat. 70. 26. The province is bounded on the north by the Samoiedo, on the west by Ziranía and Ulatka, and on the east by Siberia.
- PERNAMBUCO**, a province of Brasil in South America, bounded on the north by Tamera, on the east by the ocean; on the south by Seregipá, and on the west by Tapuyers. It is about 200 miles in length, and 150 in breadth. The Dutch became masters of it in 1630, but the Portuguese soon retook it from them. It produces a great quantity of sugar, and the best Brasil wood.
- PERNIO**, a kibe, or chilblain, is a little ulcer, occasioned by cold in the hands, feet, heels, nose, and lips. It will come on when warm parts are too suddenly exposed to cold, or when parts from being too cold are suddenly exposed to a considerable warmth; and has always a tendency to gangrene, in which it frequently terminates. It most commonly attacks children of a sanguine habit and delicate constitution; and may be prevented or removed by such remedies as invigorate the system, and are capable of removing any tendency to gangrene in the constitution. See *Medicine*, n° 281.
- PERONEUS**, in anatomy, is an epithet applied to some of the muscles of the perone or fibula. See *Anatomy*, *Table of the muscles*.
- PERORATION**, in rhetoric, the epilogue or last part of an oration, wherein what the orator had insisted on through his whole discourse is urged afresh with greater vehemence and passion. The peroration consists of two parts. 1. Recapitulation; wherein the substance of what was dissipated throughout the whole speech is collected briefly and cursorily, and summed up with new force and weight. 2. The moving the passions; which is so peculiar to the peroration, that the masters of the art call this part *sedes affectuum*. The passions to be raised are various, according to the various kinds of oration. In a panegyric, love, admiration, emulation, joy, &c. In an invective, hatred, contempt, &c. In a deliberation, hope, confidence, or fear. The qualities required in the peroration are, that it be very vehement and passionate, and that it be short; because, as Cicero observes, tears soon dry up.
- PERONNE**, a strong town of France, in Picardy, capital of Santerre. It is said never to have been taken, though often besieged. It is seated on the river Somme, in E. Long. 3. 1. N. Lat. 44. 50.
- PERPENDICULAR**, in geometry, a line falling directly on another line, so as to make equal angles on each side. See *Geometry*.
- PERPETUAL**, something that endures always, or lasts for ever.
- PERPETUAL Motion**. See *MOVEMENT*.
- PERPIGNAN**, a considerable town of Roussillon in France, with a strong citadel, an university, and a bishop's see. It is seated on the river Tet; over which there is a handsome bridge, partly in a plain, and partly on a hill, E. Long. 6. 43. N. Lat. 45. 18.
- PERQUISITE**, in a general sense, something gained by a place over and above the settled wages.
- PERQUISITE**, in law, is any thing gotten by a man's own industry, or purchased with his money; in contradistinction to what descends to him from his father or other ancestor.
- PERRAULT** (Claude), the son of an advocate in parliament, was born at Paris in 1613; and was bred a physician, though he never practised but among his relations, friends, and the poor. He discovered early a particular taste for the sciences and fine arts; of which he acquired a consummate knowledge without the assistance of a master; he excelled in architecture, painting, sculpture, mathematics, physics, and all those arts that relate to designing and mechanics. The entrance into the Louvre, which was designed by him, is, according to the judgment of Voltaire, one of the most august monuments of architecture in the world. M. Colbert put him upon translating Vitruvius into French; which he performed, and published it in 1673, folio, with figures from his own drawings; which are said to have been more exactly finished than the plates themselves. When the academy of sciences was established, he was one of its first members, and was chiefly depended on for mechanics and natural philosophy. His works are, *Memoirs pour servir à l'Histoire naturelle des Animaux*, folio, 1676, with figures; *Essais de Physique*, 4 vols 12mo, 1688; *Recueil de plusieurs machines de nouvelle invention*, 4to, 1700, &c. He died in 1688.
- PERRAULT** (Charles), the brother of Claude, was born at Paris in 1626, with as great a genius for arts, and a greater for letters, than his brother. Colbert chose him first clerk of the buildings, of which he was superintendent, and afterward made him comptroller general of the finances under him. He was one of the first members of the academy of the belles lettres and inscriptions, and was received into the French academy in 1671. His poem, *La Peinture*, printed in 1668, was universally admired: that intitled *La fiesle de Louis le Grand*, in which he exalted the modern authors above the ancient, was a prelude to a war with all the learned. After he had disengaged himself from this contest, he applied himself to draw up eulogies of several great men of the 17th century, with their portraits, of which he has collected 102. There are other esteemed works of Perrault.—Besides these there were two other brothers, *Peter* and *Nicholas*, who made themselves known in the literary world.
- PERRON** (James Davy Du), a cardinal distinguished by his abilities and learning, was born in the canton of Bern in 1556. He was educated by Julian Davy, his father, a very learned Calvinist, who taught him Latin and the mathematics; after which, he by himself became acquainted with the Greek and Hebrew, philosophy, and the poets. Philip Desportes, abbot of Tyron, made him known to Henry III. king of France, who conceived a great esteem for him. Some time after, Du Perron abjured Calvinism, and afterwards embraced the ecclesiastical function; and having given great proofs of his wit and learning, he was chosen to pronounce the funeral oration of Mary queen of Scots. After the murder of Henry III. he retired to the house of Cardinal de Bourbon, and took great pains

Perrot
Persecution

pains in bringing back the Protestants to the church of Rome. Among others, he gained over Henry Spoudanus, afterwards bishop of Pamiers. He also chiefly contributed to engage Henry IV. to change his religion; and that prince sent him to negotiate his reconciliation to the holy see, in which he succeeded. Du Perron was consecrated bishop of Evreux while he resided at Rome. On his return to France, he wrote, preached, and disputed against the reformed; particularly against Du Pleffis Mornay, with whom he had a public conference in the presence of the king at Fontainebleau. He was made cardinal in 1604, by pope Clement VIII. at the solicitation of Henry IV. who afterwards nominated him to the archbishopric of Sens. The king at length sent him to Rome with Cardinal Joyeuse, in order to terminate the disputes which had arisen between Paul V. and the Venetians. It is said that this pope had such an high opinion of the address of the cardinal Du Perron, that he used to say, "Let us pray to God to inspire the cardinal Du Perron, for he will persuade us to do whatever he pleases." After the death of Henry IV. he retired into the country, where he put the last hand to his works; and, setting up a printing-house, corrected every sheet himself. He died at Paris in 1618. His works were collected after his death; and published at Paris in 3 vols folio.

PERROT (Nicholas), Sieur d'Abancourt, one of the first geniuses of his age, was born at Chalons in 1606. After studying philosophy about three years, he was sent to Paris to follow the law. At eighteen years of age he was admitted advocate of parliament, and frequented the bar; but he soon conceived a distaste for it, and therefore discontinued his practice. This displeased an uncle, but whose favour he recovered by quitting the Protestant religion. He could not, however, be prevailed upon to take orders in the Romish church; and some years after, he had a desire to return to the religion he had abjured. But, that he might not do any thing rashly, he resolved to study philosophy and divinity. For that purpose he chose for his master Mr Stuart a Scotsman and Lutheran, a man of great learning. Almost three years he spent in the most assiduous study; and then set out from Paris to Champagne, where he abjured the Roman Catholic, and once more embraced the Protestant religion. In 1637 he was admitted a member of the French academy; a little after which, he undertook a translation of Tacitus. Whilst he was engaged in that laborious task, he retired to his small estate of Abancourt, and lived there till his death, in 1664. He was a man of fine understanding, of great piety and integrity, and of universal learning. Moreri has given a catalogue of his works, the greatest part of which consist of translations, which seemed rather originals.

PEKRY, a drink made from pears, in the same manner as cyder is from apples. See CYDER.

PERSECUTION, is any pain or affliction which a person designedly inflicts upon another; and, in a more restrained sense, the sufferings of Christians on account of their religion.

Historians usually reckon ten general persecutions, the first of which was under the emperor Nero, 31 years after our Lord's ascension; when that emperor

having set fire to the city of Rome, threw the odium of that execrable action on the Christians, who under that pretence were wrapped up in the skins of wild beasts, and worried and devoured by dogs; others were crucified, and others burnt alive. The second was under Domitian, in the year 95. In this persecution St John the apostle was sent to the isle of Patmos; in order to be employed in digging in the mines. The third began in the third year of Trajan, in the year 100, and was carried on with great violence for several years. The fourth was under Antoninus the philosopher, when the Christians were banished from their houses, forbidden to shew their heads, reproached, beaten, hurried from place to place, plundered, imprisoned, and stoned. The fifth began in the year 197, under the emperor Severus. The sixth began with the reign of the emperor Maximinus in 235. The seventh, which was the most dreadful persecution that had ever been known in the church, began in the year 250, in the reign of the emperor Decius, when the Christians were in all places driven from their habitations, stripped of their estates, tormented with racks, &c. The eighth began in the year 257, in the fourth year of the reign of the emperor Valerian. The ninth was under the emperor Aurelian, A. D. 274; but this was very inconsiderable: and the tenth began in the 19th year of Dioclesian, A. D. 303. In this dreadful persecution, which lasted ten years, houses filled with Christians were set on fire, and whole droves were tied together with ropes and thrown into the sea.

PERSEPOLIS, formerly the capital of Persia, situated in N. Lat. 30. 30. E. Long. 84°; now in ruins, but remarkable for the most magnificent remains of a palace or temple that are to be found throughout the world.—This city stood in one of the finest plains in Persia, being 18 or 19 leagues in length, and in some places two, in some four, and in others six leagues in breadth. It is watered by the great river Araxes, now Bendemir, and by a multitude of rivulets besides. Within the compass of this plain, there are between 1000 and 1500 villages, without reckoning those in the mountains, all adorned with pleasant gardens, and planted with shady trees. The entrance of this plain on the west side has received as much grandeur from nature, as the city it covers could do from industry or art. It consists of a range of mountains steep and high, four leagues in length, and about two miles broad, forming two flat banks, with a rising terrace in the middle, the summit of which is perfectly plain and even, all of native rock. In this there are such openings, and the terraces are so fine and so even, that one would be tempted to think the whole the work of art, if the great extent, and prodigious elevation thereof, did not convince one that it is a wonder too great for aught but nature to produce. Undoubtedly these banks were the very place where the advanced guards from Persepolis took post, and from which Alexander found it so difficult to dislodge them. One cannot from hence deny the ruins of the city, because the banks are too high to be overlooked; but one can perceive on every side the ruins of walls and of edifices, which heretofore adorned the range of mountains of which we are speaking. On the west and on the north, this city is defended in the

Perfe-
rance
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Persia.

like manner: so that, considering the height and evenness of these banks, one may safely say, with a late innocent traveller, that there is not in the world a place so fortified by nature. The ancient palace of the kings of Persia, called by the inhabitants *Chilminar*, i. e. forty columns, is situated at the foot of the mountain; the walls of this stately building are still standing on three sides: but as a particular account of the noble remains of antiquity to be met with there would exceed our limits, we must refer the reader to Sir John Chardin's travels, or the fifth volume of the Universal History, where a full description of them is given.

PERSEVERANCE, in theology, a Christian virtue, by which we are enabled to persist in the way of salvation to the end.

The final perseverance of the saints is a doctrine much controverted between the Arminians and Calvinists; the latter of whom maintain that it is impossible for grace to be lost, and consequently make perseverance to the end a necessary consequence thereof; while the others imagine, that the most confirmed believers are never out of a possibility of falling.

PERSEUS, the most ancient of all the Greek heroes, founded the city of Mycenæ, of which he became afterwards king, and where he and his posterity reigned for 100 years. He flourished, according to most chronologists, 1348 B.C. but, according to Sir Isaac Newton, only 1028.

PERSEUS, in astronomy. See there, n° 206.

PERSIA, a most ancient and celebrated empire of Asia, extending in length from the mouth of the river Araxes to that of the river Indus, about 1840 of our miles, and in breadth from the river Oxus to the Persian gulph, about 1080 of the same miles. It is bounded on the north by the Caspian Sea, the river Oxus, and mount Caucasus; on the east, by the river Indus and the dominions of the Great Mogul; on the south, by the Persian gulph and the Indian ocean; and on the west, by the dominions of the Grand Signior.

The most ancient name of this country was that of *Elam*, or, as some write it, *Elam*, from Elam the son of Shem, from whom its first inhabitants are descended. Herodotus calls its inhabitants *Cephene*s; and in very ancient times the people are said to have called themselves *Artai*, and the country where they dwelt *Artæa*. In the books of Daniel, Elisha, &c. it is called by the names of *Paræ*, *Pharas*, or *Fars*, whence the modern name of *Persia*; but whence those names have been derived, is now uncertain.

That Persia was originally peopled by Elam the son of Shem is universally allowed; but before the time of Cyrus we know little or nothing of their history. This prince is celebrated both by sacred and profane historians; but the latter are at no small variance concerning his birth and accession to the throne. According to Herodotus, Astyages, the last king of the Medes, being warned in a dream, that the son who was to be born of his daughter Mandane, should one day be lord of Asia, resolved to marry her, not to a Mede, but to a Persian. Accordingly, he chose for her husband one Cambyzes, a man of a peaceable disposition, and of no very high station. However, about a year after they were married, Astyages was frightened by another

dream, which made him resolve to dispatch the infant as soon as it should be born. Hereupon the king sent for his daughter, and put her under confinement, where she was soon after delivered of a son. The infant was committed to the care of one Harpagus, with strict orders to destroy it in what manner he thought proper. But he, having acquainted his wife with the command he had received, by her advice gave it to a shepherd, desiring him to let it perish by exposing it. But the shepherd, out of compassion, exposed a still-born child which his wife happened to be then delivered of, and brought up the son of Mandane as his own, giving him the name of *Cyrus*.

When the young prince had attained the age of ten years, as he was one day at play with other children of the same age, he was chosen king by his companions; and having, in virtue of that dignity, divided them into several orders and classes, the son of Artambares, a lord of eminent dignity among the Medes, refused to obey his orders; whereupon Cyrus caused him to be seized, and whipped very severely. The boy ran crying to his father; and he immediately hastened to the king's palace, loudly complaining of the affront his son had received from the son of a slave, and intreating Astyages to revenge, by some exemplary punishment, the indignity offered to him and his family. Astyages, commanding both the herdsman and his son to be brought before him, asked the latter, how he, who was the son of so mean a man, had dared to abuse the son of one of the chief lords of the kingdom? Cyrus replied, that he had done no more than he had a right to do; for the boys of the neighbourhood having chosen him king, because they thought him most worthy of that dignity, and performed what he, vested with that character, had commanded, the son of Artambares alone had slighted his orders, and for his disobedience had suffered the punishment he deserved. In the course of this conversation Astyages happening to recollect, that his grandson, whom he had ordered to be destroyed, would have been about the same age with Cyrus, began to question the shepherd concerning his supposed son, and at last obtained from him a confession of the whole truth.

Astyages having now discovered Cyrus to be his grandson, sent for Harpagus, who also confessed that he had not seen Mandane's son destroyed, but had given him to the shepherd; at which Astyages was so much incensed, that, having invited Harpagus to an entertainment, he caused him to be served with the flesh of his own son. When he had done, the king asked him whether he liked his victuals; and Harpagus answering, that he had never tasted any thing more delicious, the officers appointed for that purpose brought in a basket, containing the head, hands, and feet of his son, desiring him to uncover the basket, and take what he liked best. He did as they desired, and beheld the mangled remains of his only child without betraying the least concern, so great was the command which he had over his passions. The king then asked him, whether he knew with what kind of meat he had been entertained. Harpagus replied, that he knew very well, and was always pleased with what his sovereign thought fit to ordain; and having thus replied, with a surprising temper, he collected the mangled parts of his innocent son, and went home.

Astyages

Persia.

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Different
names of
the country.

■
Accounts
of the birth
of Cyrus.

Persia.

Astyages having thus vented his rage on Harpagus, began next to consult what he should do with Cyrus. The magi, however, eased him of his fears with regard to him, by assuring him; that as the boy had been once chosen king by his companions, the dream had been already verified, and that Cyrus never would reign in any other sense. The king, being well pleased with this answer, called Cyrus, and, owning how much he had been wanting in the affection which he ought to have had towards him, desired him to prepare for a journey into Persia, where he would find his father and mother in circumstances very different from those of the poor shepherd and his wife with whom he had hitherto lived. Cyrus, on his arrival at his father's house, was received with the greatest joy. When he grew up, he soon became popular on account of his extraordinary parts; till at last his friendship was courted by Harpagus, who had never forgot the cruel treatment he received from Astyages. By his means a conspiracy was formed against Astyages; who being overthrown in two successive engagements, was taken prisoner and confined for life.

The account given by Xenophon of the rise of Cyrus is much more consonant to scripture; for he tells us, that Babylon was conquered by the united forces of the Medes and Persians. According to him, Cyrus was the son of Cambyzes king of the Medes, and Mandane the daughter of Astyages king of Persia. He was born a year after his uncle Cyaxares, the brother of Mandane. He lived till the age of twelve with his parents in Persia, being educated after the manner of the country, and inured to fatigues and military exercises. At this age he was taken to the court of Astyages, where he resided four years; when the revolt of the Medes and Persians from the Babylonians happened, and which ended in the destruction of the Babylonish empire, as related under the article *BABYLON*.

While Cyrus was employed in the Babylonish war, before he attacked the metropolis itself, he reduced all the nations of Asia Minor. The most formidable of these were the Lydians, whose king Cræsus assembled a very numerous army, composed of all the other nations in that part of Asia, as well as of Egyptians, Greeks, and Thracians. Cyrus being informed of these vast preparations, augmented his forces to 196,000 men, and with them advanced against the enemy, who were assembled near the river Pactolus. After long marches, he came up with them at Thymbra, not far from Sardis the capital of Lydia. Besides the horse and foot, which amounted to 196,000, as already observed, Cyrus had 300 chariots armed with scythes, each chariot drawn by four horses abreast, covered with trappings that were proof against all sorts of missile weapons: he had likewise a great number of chariots of a larger size, upon each of which was placed a tower about 18 or 20 feet high, and in each tower were lodged 20 archers. These towers were drawn by 16 oxen yoked abreast. There was moreover a considerable number of camels, each mounted by two Arabian archers, the one looking towards the head, and the other towards the hinder part of the camel. The army of Cræsus consisted of 420,000 men. The Egyptians, who alone were 120,000 in number, being the main strength of the army, were placed in the centre. Both armies were drawn up in an im-

mense plain, which gave room for the extending of the wings on either side; and the design of Cræsus, upon which alone he founded his hopes of victory, was to surround and hem in the enemy's army.

When the two armies were in sight of each other, Cræsus, observing how much his front exceeded that of Cyrus, made the centre halt, but commanded the two wings to advance, with a design to inclose the Persian army, and begin the attack on both sides at once. When the two detached bodies of the Lydian forces were sufficiently extended, Cræsus gave the signal to the main body, which marched up to the front of the Persian army, while the two wings attacked them in flank; so that Cyrus's army was hemmed in on all sides, and, as Xenophon expresses it, was inclosed like a small square drawn within a great one. This motion, however, did not at all alarm the Persian commander; but, giving his troops the signal to face about, he attacked in flank those forces that were going to fall upon his rear, so vigorously, that he put them into great disorder. At the same time a squadron of camels was made to advance against the enemy's other wing, which consisted mostly of cavalry. The horses were so frightened at the approach of these animals, that most of them threw their riders and trod them under foot; which occasioned great confusion. Then Artagefes, an officer of great valour and experience, at the head of a small body of horse, charged them so briskly, that they could never afterwards rally; and at the same time the chariots, armed with scythes, being driven in among them, they were entirely routed. Both the enemy's wings being thus put to flight, Cyrus commanded his chief favourite Abradates to fall upon the centre with the large chariots above-mentioned. The first ranks, consisting mostly of Lydians, not being able to stand so violent a charge, immediately gave way; but the Egyptians, being covered with their bucklers, and marching so close that the chariots had not room to penetrate their ranks, a great slaughter of the Persians ensued. Abradates himself was killed, his chariot overturned, and the greatest part of his men were cut in pieces. Upon his death, the Egyptians, advancing boldly, obliged the Persian infantry to give way, and drove them back quite to their engines. There they met with a new shower of darts and javelins from their machines; and at the same time the Persian rear advancing sword in hand, obliged their spearmen and archers to return to the charge. In the mean time Cyrus, having put to flight both the horse and foot on the left of the Egyptians, pushed on to the centre, where he had the misfortune to find his Persians again giving ground; and judging that the only way to stop the Egyptians, who were pursuing them, would be to attack them in the rear, he did so; and at the same time the Persian cavalry coming up to his assistance, the fight was renewed with great slaughter on both sides. Cyrus himself was in great danger; for his horse being killed under him, he fell among the midst of his enemies: but the Persians, alarmed at the danger of their general, threw themselves headlong on their opponents, rescued him, and made a terrible slaughter; till at last Cyrus, admiring the valour of the Egyptians, offered them honourable conditions; letting them know at the same time, that all their allies had abandoned them. They accepted the terms offered them; and having

Persia.

4
The battle
of Thym-
bra.

3
His war
with the
Lydians.

Perſia. having agreed with Cyrus that they ſhould not be obliged to carry arms againſt Croſus, they engaged in the ſervice of the conqueror, and continued faithful to him ever after.

5
Sardis taken, and the Lydian empire overthrown.
The next morning Cyrus advanced towards Sardis, and Croſus marched out to oppoſe him at the head of the Lydians only; for his allies had all abandoned them. Their ſtrength conſiſted moſtly in cavalry: which Cyrus being well apprized of, he ordered his camels to advance; by whom the horſes were ſo frightened, that they became quite ungovernable. However, the Lydians diſmounted, and for ſome time made a vigorous reſiſtance on foot; but were at laſt driven into the city, which was taken two days after: and thus the Lydian empire was totally deſtroyed.

6
Reduces Babylon.
After the conqueſt of Sardis, Cyrus turned his arms againſt Babylon itſelf, which he reduced in the manner related under that article. Having ſettled the civil government of the conquered kingdoms, Cyrus took a review of all his forces, which he found to conſiſt of 600,000 foot, 120,000 horſe, and 2000 chariots armed with ſcythes. With theſe he extended his dominion all over the nations to the confines of Ethiopia, and to the Red ſea; after which he continued to reign peaceably over his vaſt empire till his death, which happened about 529 before Chriſt. According to Xenophon, he died a natural death; but others tell us, that, having engaged in a war with the Scythians, he was by them overthrown and cut in pieces with his whole army, amounting to 200,000 men. But this is very improbable, ſeeing all authors agree, that the tomb of Cyrus was extant at Paſargada in Perſia in the time of Alexander the Great; which it could not have been, if his body had remained in the poſſeſſion of the Scythians, as theſe authors aſſert.

7
His death.
In the time of Cyrus, the Perſian empire extended from the river Indus to the Egean ſea. On the north it was bounded by the Euxine and Caſpian ſeas, and on the ſouth by Ethiopia and Arabia. That monarch kept his reſidence for the ſeven cold months at Babylon, by reaſon of the warmth of that climate; three months in the ſpring he ſpent at Suſa, and two at Ec-batan during the heat of ſummer. On his death-bed he appointed his ſon Cambyſes to ſucceed him in the empire; and to his other ſon, Smerdis, he gave ſeveral conſiderable governments. The new monarch immediately ſet about the conqueſt of Egypt; which he accompliſhed in the manner related in the hiſtory of that country.

8
Cambyſes conquers Egypt.
Having reduced Egypt, Cambyſes next reſolved to turn his arms againſt the Carthaginians, Hammonians, and Ethiopians. But he was obliged to drop the firſt of theſe enterprizes, becauſe the Phœnicians reſuſed to ſupply him with ſhips againſt the Carthaginians, who were a Phœnician colony. However, he ſent ambaffadors into Ethiopia with a deſign to get intelligence of the ſtate and ſtrength of the country. But the Ethiopian monarch, being well apprized of the errand on which they came, treated them with great contempt. In return for the preſents ſent him by Cambyſes, he ſent his own bow; and adviſed the Perſians to make war upon the Ethiopians when they could bend ſuch a ſtrong bow as eaſily as he did, and to thank the gods that the Ethiopians had no ambition to extend their dominions beyond their own country.

Cambyſes was no ſooner informed of this anſwer by his ambaffadors, than he flew into a violent paſſion; and ordered his army immediately to begin their march, without conſidering that they were neither furniſhed with provisions nor any other neceſſary. When he arrived at Thebes in Upper Egypt, he detached 50,000 men, with orders to deſtroy the temple of Jupiter Ammon: but all theſe perished in the deſert; not a ſingle perſon arriving either at the oracle, or returning to Thebes. The reſt of the army, led by Cambyſes himſelf, experienced incredible hardſhips; for, not being provided with any neceſſaries, they had not marched a fifth part of the way when they were obliged to kill and eat their beaſts of burthen. When theſe failed, the ſoldiers fed on graſs and roots, as long as any could be found; and at laſt were reduced to the dreadful neceſſity of eating one another; every tenth man, on whom the lot fell, being condemned to ſerve as food for his companions. The king, however, obſtinately perſiſted in his deſign; till, being apprehenſive of the danger he himſelf was in, he retreated to Thebes, after having loſt the greateſt part of his army.

Cambyſes was a man of a very cruel and ſuſpicious temper, of which he gave many inſtances; and the following proved indirecſtly the cauſe of his death.— We have already obſerved that the king of Ethiopia ſent his bow in return for the preſents brought to him by the ambaffadors of Cambyſes. The only man in the Perſian army who could bend this bow was Smerdis the king's brother; and this inſtance of his perſonal ſtrength ſo alarmed the tyrant, that, without any crime alleged, he cauſed him to be murdered. This gave occaſion to one Smerdis, a magi, who greatly reſembled the other Smerdis in looks, to aſſume the name of the deſeased prince, and to raiſe a rebellion againſt Cambyſes who was generally hated for his cruelty; and this he could the more eaſily do, as the chief management of affairs had been committed to this Smerdis during the king's abſence. Cambyſes, on receiving the news of this revolt, immediately ordered his army to march, in order to ſuppreſs it; but as he was mounting his horſe, his ſword, ſlipping out of its ſcabbard, wounded him in the thigh. On this accident, he aſked the name of the city where he was; and being told that it was Ec-batan, he ſaid in the preſence of all his attendants, " Fate has decreed, that Cambyſes the ſon of Cyrus ſhall die in this place." For, having conſulted the oracle of Butus, which was very famous in that country, he was told that he ſhould die at Ec-batan. This he had always underſtood of Ec-batan in Media, and had therefore reſolved to avoid it. Being now, however, convinced that his end approached, he aſſembled the chief Perſian lords who ſerved in the army, and having told them that his brother was certainly dead, he exhorted them never to ſubmit to the impoſtor, or ſuffer the ſovereignty again to paſs from the Perſians to the Medes, to which nation Smerdis belonged, but to uſe their utmoſt endeavours to place one of their own blood on the throne.

As the king's wound mortified, he lived but a few days after this; but the aſſembly ſuppoſing that he had ſpoken only out of hatred to his brother, quietly ſubmitted to the impoſtor, who was thus for a time eſta-

Perſia. 9
His unſucceſsful expedition againſt Ethiopia and the Hammonians.

10
He murders his brother.

11
His death.

Perſia. eſtabliſhed on the throne. Indeed, from his conduct during the ſhort time which he enjoyed the kingdom, he appears to have been not at all undeſerving of a crown. He began with granting to all his ſubjects an exemption from taxes and military ſervice for three years, and treated all of them in the moſt beneficent manner. To ſecure himſelf on the throne the more effectually, he married Atoſſa the daughter of Cyrus; thinking, that, in caſe of a diſcovery, he might hold the empire by her title. She had before been married to her brother Cambyſes, on a deciſion of the magi that a king of Perſia might do as he pleaſed; and by virtue of this deciſion Smerdis alſo married her as her brother. The extreme caution of Smerdis, however, promoted the diſcovery of his impoſture. He had married all his predecessor's wives, among whom was one Phedyma, the daughter of Otanes a Perſian nobleman of the firſt rank. Otanes, who ſuſpected that the king was not Smerdis the ſon of Cyrus, ſent a truſty meſſenger to his daughter, deſiring to know whether he was fo or not; but Phedyma, having never ſeen this Smerdis, could not give any anſwer. Her father then deſired her to inquire at Atoſſa, who could not but know her own brother. However, he was again diſappointed; for Phedyma acquainted him that all the king's wives were lodged in diſtinct and ſeparate apartments, without being allowed to ſee each other. This greatly increaſed the ſuſpicions of Otanes; upon which he ſent his daughter a third meſſage, deſiring her, the next time ſhe ſhould be admitted to the king's bed, to take an opportunity of feeling whether he had ears or not: for Cyrus had formerly cauſed the ears of Smerdis the magi to be cut off for ſome crime of which he had been guilty; ſo that, if the king had ears, he might then be aſſured that he was Smerdis the ſon of Cyrus. The event ſhewed that the ſuſpicions of Otanes were juſt; and Phedyma having acquainted her father that the king had no ears, a conspiracy was immediately formed againſt him. While the conſpirators were debating about the proper means of carrying their deſigns into execution, Darius the ſon of Hyſtaſpes happening to arrive at Siſa where his father was governor, they all agreed to make him privy to their deſign. He told them, at their firſt meeting, that he thought nobody in the empire but himſelf had known that Smerdis the ſon of Cyrus was dead, and the throne uſurped by a magi; that he had come with a deſign to kill the uſurper, without imparting his deſign to any one, that the glory of ſuch an action might be entirely his own. But ſince others were apprized of the impoſture, he inſiſted that the uſurper ſhould be diſpatched without delay. Otanes, on the other hand, was for putting off the enterpriſe till ſome better opportunity offered; but Darius proteſted, that if they did not make the attempt that very day, he would prevent any one from accuſing him, by diſcloſing the whole matter to the magi himſelf.

In the mean time, Smerdis and his brother had by great promiſes prevailed on Prenaspes (the executioner of the true Smerdis) to bind himſelf by an oath not to diſcover the fraud they had put on the Perſians, and even to make a public ſpeech, declaring that the preſent king of Perſia was really the ſon of Cyrus. At the time appointed, he began his diſcourſe with the genealogy of Cyrus, putting his hearers in mind of the

great favours the nation had received from that prince. After having extolled Cyrus and his family, to the great alſonſhment of all preſent, he confeſſed the whole tranſaction with regard to the death of Smerdis; telling the people, that the apprehenſions of the danger he muſt inevitably run by publiſhing the impoſture had conſtrained him to conceal it ſo long; but now, not being able any longer to act ſuch a diſhonourable part, he acknowledged that he had been compelled by Cambyſes to put his brother to death with his own hand, and that the perſon who poſſeſſed the throne was Smerdis the Magi. He then begged pardon of the gods and men for the crime he had committed; and ſulminating many imprecations againſt the Perſians if they failed to recover the ſovereignty, he threw himſelf headlong from the top of the tower on which he ſtood, and died on the ſpot.

In the mean time the conſpirators, who were advancing towards the palace, were informed of what had happened; and Otanes was again for deſerting the execution of their enterpriſe: but Darius inſiſting upon the danger of delay, they proceeded boldly to the palace; and being admitted by the guards, who did not ſuſpect them, they killed both the uſurper and his brother; after which, they expoſed their heads to the people, and declared the whole impoſture. The Perſians at this were ſo enraged, that they fell on the whole ſect, and killed every one of the magi they could meet with; and had not the ſlaughter been ſtopped by night, not one of the order would have been left alive. The day on which this ſlaughter happened was afterwards celebrated by the Perſians with the greateſt ſolemnity, and called by the name of *Magophonia*, or the *ſlaughter of the Magi*. On that feſtival the magi durſt not appear abroad, but were obliged to ſhut themſelves up in their houſes. Smerdis the magi reigned only eight months.

When the tumult was a little ſubſided, the conſpirators, who were ſeven in number, met together in order to elect a new king, or to determine what form of government they ſhould next introduce. Otanes was for a republic: but being over-ruled by the reſt, he declared, that as he was determined not to be a king, neither would he be ruled by one; and therefore inſiſted that he and his family ſhould ever afterwards remain free from ſubjection to the royal power. This was not only granted, but it was further agreed by the other fix, that whoever was choſen ſhould every year preſent Otanes with a Median veſt, a mark of great diſtinction among the Perſians, becauſe he had been the chief author of the enterpriſe. They further agreed to meet at a certain place next morning at ſun-riſe on horſeback, and that he whoſe horſe firſt neigh- ed ſhould be king. This being overheard by Oebores, Darius Hyſtaſpes choſen king. who had the care of Darius's horſes, he led a mare over-night to the place, and brought his maſter's horſe to her. The next morning, the horſe remembering the place, immediately neighed for the mare; and the five lords diſmounting, adored Darius as their king.

Darius Hyſtaſpes was elected king of Perſia in the year 522 B. C. Immediately after his acceſſion, he promoted the other fix conſpirators to the firſt employments in the kingdom, married the two daughters of Cyrus, Atoſſa and Artyſtana, Parmys the daughter of the true Smerdis, and Phedyma the daughter of O-

Persia.

tanee, who had detected the magi. He then divided the whole empire into 20 satrapies or governments, and appointed a governor over each division, ordering them to pay him an annual tribute. The inhabitants of Colchis, with some others, were enjoined only to make annual presents, and the Arabians to furnish every year such a quantity of frankincense as equalled the weight of 1000 talents. Thus Darius received the yearly tribute of 14,560 Eubæic talents, upwards 260,000 pounds Sterling.

17
Revolt of
the Babylo-
nians.

Under Darius, the building of the temple of Jerusalem, which had been obstructed by Cambyzes and Smerdis, went on successfully, and the Jewish state was entirely reformed. The most remarkable of Darius's other transactions were his expeditions against Babylon; against Scythia, India, and Greece. The expedition against Babylon took place in the 517 B. C. when that people, unable to bear the oppression of the Persians, and likewise discontented because the seat of government was removed from their city to Susa in Persia, took the opportunity of the troubles which happened in the reigns of Cambyzes and Smerdis, to store their city with all kinds of provisions sufficient to serve them for many years; after which they broke out into an open rebellion, and this quickly brought upon them Darius with all his forces. The Babylonians perceiving themselves shut up by so numerous an army, turned all their thoughts towards the supporting of a long siege, which they imagined would tire out the king's troops. To prevent the consumption of their provisions, they took the most barbarous and cruel resolution that ever was put in execution by any nation. They agreed among themselves to get rid of all unnecessary mouths; and therefore, gathering together all the old men, women, and children, they strangled them without distinction; every one being allowed only to keep the wife he liked best, and a maid-servant to do the work of the house. The siege continued for a year and eight months; nor was there any likelihood of its being ended, when Zopyrus, one of Darius's chief commanders, put him in possession of it by the following stratagem. He cut off his nose and ears, and having mangled his body with stripes in a most cruel manner, he fled to the Babylonians thus disfigured, pretending that he had been so treated by Darius, for advising him to raise the siege. Being intrusted with the command of some forces, he cut off several parties of the Persian army, whom Darius thus sacrificed in order to raise the character of Zopyrus the higher among the Babylonians. In this manner he so much established his credit, that at last he was made commander in chief of all the Babylonian forces, and the guard of the city committed entirely to his care; and no sooner was this done, than he delivered it up to Darius, who, to prevent their rebelling a second time, beat down the walls of that metropolis to the height of 50 cubits. Three thousand of the most active in the rebellion were impaled; the rest pardoned. As they had destroyed most of their women, the neighbouring nations were commanded to furnish them with wives, and 50,000 women were sent to that city, by which means it was prevented from being depopulated. Zopyrus was rewarded with the highest honours, and had the whole revenues of Babylon bestowed on him for life.

After the reduction of Babylon, Darius undertook a Scythian expedition, directed against those nations which lie between the Danube and the Tanais. His pretext for this war was, to revenge the calamities which these nations had brought upon Asia about 120 years before, when they invaded and subdued Media; keeping it in subjection for the space of 28 years, as we have related under that article. In this expedition he was attended with an army of 700,000 men. With these he marched to the Thracian Bosphorus; which having passed on a bridge of boats, he reduced all Thrace. From Thrace he advanced to the Danube, where he had appointed his fleet to meet him. This river he passed on another bridge of boats, and entered Scythia. His enemies, however, were too wise to oppose such a formidable power in the open field; and therefore retired before him, wasting the country as they went along, till at last the king, sensible of the danger he was in, resolved to give over the enterprise and return home. In order to do so with safety, he lighted a great number of fires in the night-time, and decamped; leaving behind him the old men and the sick, who fell into the hands of their enemies. The Scythians perceiving that Darius was gone, detached a considerable body to the bridge over the Danube; and as they were well acquainted with the roads, they got thither before the Persians. The Scythians had sent express before-hand to persuade the Ionians, whom Darius had left to guard the bridge, to break it down and retire to their own country; and this they pressed the more earnestly, that as the time prescribed by Darius was now expired, they were at liberty to return home, without breaking their word or being wanting in their duty. Miltiades, prince of the Chersonesus of Thrace, was for embracing so favourable an opportunity of cutting off Darius's retreat, and shaking off the Persian yoke at once: all the other commanders agreed with him, except Hystæus prince of Miletus; who represented to the Ionian chiefs, that their power was connected with that of Darius, since it was under his protection that each of them was lord in his own city; and that the cities of Ionia would not fail to depose them and recover their liberty, if the Persian power should sink or decline. This speech made a deep impression on the rest, and it was at last determined that they should wait for Darius; and in order to deceive the Scythians, they began to break down the bridge, but advised them to return back and defeat Darius. They did so, but missed him; and he having thus safely escaped to great a danger, immediately repassed the Bosphorus, and took up his winter-quarters at Sardis, leaving Megabyzus, one of his chief generals, to complete the conquest of Thrace.

20
The king having sufficiently refreshed his troops, He con-
who had suffered extremely in the Scythian expedition, quies In-
began to think of extending his dominions eastward; dia.
and, in order to facilitate his design, resolved in the first place to discover those countries. With this view, he caused a fleet to be built and equipped at Capatyrus, a city on the river Indus. The command of this fleet he gave to one Scylax, a Grecian of Caryandia a city of Caria, who was well versed in maritime affairs. Him he ordered to sail down the current, and make the best discoveries he could of the countries lying on either side of the river, till he arrived at the southern

Persia.

18

His unsuccess-
ful ex-
pedition
against the
Scythians.

¹ Persia. southern ocean; from whence he was to steer his course westward, and that way return to Persia. Scylax, having exactly observed his instructions, and sailed down the river Indus, entered the Red Sea by the straits of Babelmandel, and on the 30th month from his first setting out, landed at the same place from whence Necho king of Egypt formerly sent out the Phœnicians who circumnavigated Africa. From hence Scylax returned to Susa, where he gave a full account of his discoveries; upon which Darius, marching into India at the head of a powerful army, reduced that large country, and made it a province of the Persian empire, drawing from thence an annual tribute of 360 talents of gold.

²⁰ Revolt of the Ionians, &c. Soon after the expedition of Darius against India, happened the revolt of the Ionians, which gave occasion to his expedition into Greece; an account of which is given under the articles ATTICA, GREECE, SPARTA, &c. The ill success which attended him here, however, was so far from making him drop the enterprise, that it only made him the more intent on reducing the Grecians; and he resolved to head his army in person, having attributed his former bad success to the inexperience of his generals. But while he was employed in making the necessary preparations for this purpose, he received intelligence that the Egyptians had revolted, so that he was obliged to make preparations for reducing them also; and before this could be done, the king died, after having reigned 36 years, leaving the throne to his son Xerxes.

²¹ Expeditions of Xerxes against Egypt and Greece. This prince ascended the throne of Persia in the year 485 B. C.; and his first enterprise was to reduce the Egyptians; which he effectually did, bringing them into a worse state of slavery than they ever had experienced before. After this he resolved on an expedition into Greece, the unfortunate event of which is related under the article ATTICA. By his misfortunes in the Grecian expedition, he became at last so dispirited, that he thenceforth abandoned all thoughts of war and conquests; but growing tyrannical, and oppressing his subjects, he was murdered in his bed, in the year 464 B. C. the 21st of his reign; and was succeeded by his third son Artaxerxes, surnamed Longimanus on account of the great length of his arms.

²² Xerxes succeeded by Artaxerxes Longimanus. This prince is named *Abasuerus* in scripture, and is the same who married Esther, and during the whole of his reign shewed the greatest kindness to the Jewish nation. In the beginning of his reign he was opposed by Hytaspes the second son of Xerxes, whom, however, he overcame, though not without considerable difficulty. After this he applied himself to the settlement of the affairs of government, and reforming many abuses which had crept in; and then, being fully established on the throne, he appointed feasts and rejoicings to be made for 180 days in the city of Susa; at one of which he resolved to divorce his queen for disobedience; and afterwards married Esther, as we find it recorded in the sacred writings.

In the fifth year of the reign of Artaxerxes the Egyptians revolted anew, and, being assisted by the Athenians, held out for six years; but were again obliged to submit, and continued in subjection during the whole of his reign. Nothing else remarkable happened during the life of Artaxerxes Longimanus,

who died in the 41st year of his reign; and was succeeded by Xerxes II. the only son he had by his queen, though by his concubines he had 17. Xerxes II. having drunk immoderately at an entertainment immediately after his accession, retired to a chamber, in order to refresh himself with sleep; but here he was murdered by Sogdianus, the son of Artaxerxes by one of his concubines, after he had reigned 45 days.

²⁴ Sogdianus. Sogdianus was scarce seated on the throne when he put to death Bagoragus, the most faithful of all his father's eunuchs; by which, and the murder of his sovereign, he became generally odious. Upon this, sensible of the dangerous situation in which he was, he sent for one of his brothers named Ochus, whom he suspected, with a design to murder him the moment he arrived. Ochus, however, understanding his design, put off, by several pretences, his coming, till he had drawn together a powerful army, with which he advanced to the confines of Persia. Here he openly declared, that his design was to revenge his brother's death; which brought over to him many of the nobility and governors of provinces, by whom he was immediately proclaimed king. Sogdianus, seeing himself thus deserted, contrary to the advice of all his friends, came to an accommodation with Ochus; who no sooner had him in his power than he caused him to be suffocated among ashes; a punishment invented on purpose for him.

²⁵ Ochus. Ochus being firmly settled on the throne by the death of Sogdianus, changed his name to Darius; and is by historians commonly called *Darius Nothus*, or the *Barbared*. But Ariste, another of the brothers, seeing in what manner Sogdianus had got the better of Xerxes, and been afterwards driven out by Ochus, began to entertain thoughts of treating him in the same manner. He was not, however, so successful; for, being defeated in an engagement, he surrendered himself in hopes of mercy, but was immediately put to death by suffocation in ashes. Several other persons were executed: but these severities did not procure him the repose which he expected; for his whole reign was disturbed with violent commotions in various parts of the empire. One of the most dangerous was raised by Pisuthna governor of Lydia; but he being deserted by his Greek mercenaries, was at last overcome, and put to death: however, his son Amorgas continued to infest the maritime provinces of Asia Minor for two years; till he also was taken prisoner by Tissaphernes, the new governor of Lydia, who put him to death. Other insurrections quickly followed this: but the greatest misfortune which befel Darius during the whole course of his reign was the revolt of the Egyptians, who could not be reduced. Before his death, he invested Cyrus his youngest son with the supreme government of all the provinces of Asia Minor. This was done through the persuasions of his mother Parysatis, who had an absolute sway over her husband; and he procured this command for him, that he might thereby be enabled to contend for the kingdom after his father's death. She even insisted that the king should declare him heir to the crown before he died; but this he could not by any means be induced to do. He died in the year 405 B. C. and was succeeded by his son Artaxerxes, by the Greeks surnamed *Mnemon*, on account of his extraordinary memory.

Perſia.

37
Revolt of
Cyrus the
younger.

The moſt remarkable tranſaction which happened during the reign of this prince was the revolt of his brother Cyrus. This young prince had been raiſed to ſo great power through the intereſt of his mother, on purpoſe that he might revolt, as we have already ſeen. He began with gaining over the cities under the government of Tiſſaphernes; which quickly produced a war with that governor. Cyrus then began to aſſemble troops, which he pretended were deſigned only againſt Tiſſaphernes. As he had given great aſſiſtance to the Lacedæmonians in their wars againſt the Athenians, he now in return demanded aſſiſtance from them: which requeſt they very readily complied with, ordering their fleet immediately to join him, and to obey in every thing the commands of Tamos his admiral. At laſt Cyrus, having collected an army of 13,000 Greek mercenaries and 100,000 regular troops of other nations, ſet out from Sardis, directing his march towards Upper Aſia; the army being entirely ignorant of the expedition on which they were going. When they arrived at Tarſus, the Greeks, ſuſpecting that they were marching againſt the king, reſuſed to proceed any further; but Cyrus having gained them over with preſents and promiſes, they ſoon went on with ſatisfaction. Having arrived at Cunaxa in the province of Babylon, Cyrus found his brother with 900,000 men ready to engage him. Whereupon, leaping out of his chariot, he commanded his troops to ſtand to their arms and fall into their ranks; which was done with great expedition, no time being allowed the ſoldiers to reſreſh themſelves. Clearchus, the commander of the Peloponneſian troops, adviſed Cyrus not to charge in perſon, but to remain in the rear of the Greek battalions; but this advice he reſected with indignation, ſaying, that he ſhould thus render himſelf unworthy of the crown for which he was fighting. As the king's army drew near, the Greeks fell upon them with ſuch fury, that they routed the wing oppoſite to them almoſt at the firſt onſet; upon which Cyrus was with loud ſhoots proclaimed king by thoſe who ſtood next to him. But he, in the mean time, perceiving that Artaxerxes was wheeling about to attack him in flank, advanced againſt him with 600 choſen horſe, killed Artageſes captain of the king's guards with his own hand, and put the whole body to flight. In this encounter, diſcovering his brother, he ſpurred on his horſe, and, coming up to him, engaged him with great fury; which in ſome degree turned the battle into a ſingle combat. Cyrus killed his brother's horſe, and wounded himſelf on the ground; but he immediately mounted another horſe, when Cyrus attacked him again, gave him a ſecond wound, and had already liſted up his hand to give him a third, when the guards, perceiving the danger in which their king was, diſcharged their arrows at once againſt his antagoniſt, who at the ſame time throwing himſelf headlong upon his brother, was pierced through by his javelin. He fell dead upon the ſpot; and all the chief lords of his court, reſolving not to ſurvive him, were ſlain in the ſame place.

28
Battle of
Cunaxa.

In the mean time, the Greeks having defeated the enemy's left wing commanded by Tiſſaphernes, and the king's right wing having put to flight Cyrus's left, both parties, being ignorant of what had paſſed elſe-

where, imagined that they had gained the victory. But Tiſſaphernes acquainting the king that his men had been put to flight by the Greeks, he immediately rallied his troops in order to attack them. The Greeks, under the command of Clearchus, eaſily repulſed them, and purſued them to the foot of the neighbouring hills. As night was drawing near, they halted at the foot of the hill, much ſurpriſed that neither Cyrus himſelf, nor any meſſenger from him, had appeared; for as yet they knew nothing of his death and the defeat of the reſt of the army. They determined therefore to return to their camp, which they did accordingly; but found there that the greateſt part of their baggage had been plundered, and all their provisions taken, which obliged them to paſs the night in the camp without any ſort of reſreſhment. The next morning, as they were ſtill expecting to hear from Cyrus, they received the news of his death, and the defeat of that part of the army. Whereupon they ſent deputies to Ariæus, who was commander in chief of all the other forces of Cyrus, offering him, as conquerors, the crown of Perſia. Ariæus reſected the offer, and acquainting them that he intended to ſet out early in the morning on his return to Ionia, adviſed them to join him in the night. They followed his directions, and, under the conduct of Clearchus, began their march, arriving at his camp about midnight, whence they ſet out on their return to Greece. They were at a vaſt diſtance from their own country, in the very heart of the Perſian empire, ſurrounded by a victorious and numerous army, and had no way to return again but by forcing their way through an imenſe track of the enemy's country. But their valour and reſolution mattered all theſe difficulties; and, in ſpite of a powerful army, which purſued and harraſſed them all the way, they made good their retreat for 2325 miles through the provinces belonging to the enemy, and got ſafe to the Greek cities on the Euxine ſea. This retreat, (the longeſt that ever was made through an enemy's country) was conducted at firſt by Clearchus; but he being cut off through the treachery of Tiſſaphernes, Xenophon was choſen in his room, who at laſt brought his men ſafe into Greece: but for a full account of that famous retreat, ſee the article XENOPHON.

Perſia.

29
Retreat of
ten thou-
ſand Greeks

The war with Cyrus was ſcarce ended, when another broke out with the Lacedæmonians, on the following account. Tiſſaphernes being appointed to ſucceed Cyrus in all his power, to which was added all which he himſelf poſſeſſed formerly, began to oppreſs the Greek cities in Aſia in a moſt cruel manner. On this they ſent ambafſadors to Sparta, deſiring the aſſiſtance of that powerful republic. The Spartans having ended their long war with the Athenians, willingly laid hold of the preſent opportunity of breaking again with the Perſians, and therefore ſent againſt them an army under the command of Timbro, who, being ſtrengthened by the forces which returned under Xenophon, took the field againſt Tiſſaphernes. But Timbro being ſoon recalled upon ſome complaints, Dercylidas, a brave officer and experienced engineer, was appointed to ſucceed him; and he carried on the war to much more advantage than his predeceſſor. On his arrival in Aſia, finding that Tiſſaphernes was at variance with another governor named Pharnabazus, he concluded a truce

30
War with the Lacedæ-
monians.

Perſia. truce with the former, and marching againſt Pharnabazus, drove him quite out of Æolia, and took ſeveral cities in other parts. The latter, however, immediately repaired to the Perſian court, where he made loud complaints againſt Tiſſaphernes, but gave the king a moſt ſalutary advice, which was to equip a powerful fleet, and give the command of it to Conon the Athenian, the beſt ſea-officer of his time, by which means he would obſtruct the paſſage of further recruits from Greece; and thus ſoon put an end to the power of the Lacedæmonians in Aſia. This advice being approved of, the king ordered 500 talents for the equipment of a fleet, with directions to give Conon the command of it.

In the mean time, Darcyllidas, with all his valour and ſkill, ſuffered himſelf to be drawn into ſuch a diſadvantageous ſituation, that he muſt inevitably have been deſtroyed with his whole army, had it not been through the cowardice of Tiſſaphernes, who, having experienced the Grecian valour at the battle of Cunaxa, could not by any means be induced to attack them. The Lacedæmonians, however, having heard that the Perſian monarch was fitting out a great fleet againſt them, reſolved to puſh on the war as vigorouſly as poſſible; and for this purpoſe ſent over Ageſilaus one of their kings, and a moſt experienced commander, into Aſia. This expedition was carried on with ſuch ſecrecy, that Ageſilaus arrived at Ephelus before the Perſians had the leaſt notice of his deſigns. Here he took the field with 10,000 foot and 4000 horſe, and falling upon the enemy while they were totally unprepared, carried every thing before him. Tiſſaphernes deceived him into a truce till he had leiſure to aſſemble his forces, but gained little by his treachery; for Ageſilaus deceived him in his turn, and, while Tiſſaphernes marched his troops into Caria, the Greeks invaded and plundered Phrygia.

Early in the ſpring, Ageſilaus gave out that his deſign was to invade Lydia; but Tiſſaphernes, who remembered the laſt year's ſtratagem, now taking it for granted that Ageſilaus would really invade Caria, made his troops again march to the defence of that province. But Ageſilaus now led his army into Lydia as he had given out, and approached Sardis; upon which Tiſſaphernes recalled his forces from their former rout, with a deſign to relieve the place. But Caria being a very mountainous country, and unſit for horſe, he had marched thither only with the foot, and left the horſe behind on the borders of that province. Whence, on their marching back to the relief of Sardis, the horſe being ſome days march before the foot, Ageſilaus took the advantage of ſo favourable an opportunity, and fell upon them before the foot could come to their aſſiſtance. The Perſians were routed at the very firſt onſet; after which Ageſilaus over-ran the whole country, enriching both himſelf and his army with the ſpoils of the conquered Perſians.

By this continued ill fortune Artaxerxes was ſo much provoked againſt Tiſſaphernes, that he ſoon after cauſed him to be put to death.

On the death of Tiſſaphernes, Tithrauſtes, who was appointed to ſucceed him, ſent large preſents to Ageſilaus, in hopes of perſuading him to abandon his conqueſts; but finding that commander was not by any means to be induced to relinquish the war, he ſent Ti-

mocrates of Rhodes into Greece, with large ſums of money to corrupt the leading men in the cities, and rekindle a war againſt the Lacedæmonians. This ſtratagem produced the intended effect; for the cities of Thebes, Argos, Corinth, and others, entering into a confederacy, obliged them to recall Ageſilaus to the defence of his own country.

After the departure of Ageſilaus, which happened in the year 354 B. C. the Lacedæmonian power received a ſevere blow at Cnidus, where their fleet was entirely defeated by that of Artaxerxes under Conon, 50 of their ſhips being taken in the engagement; after which, Conon and Pharnabazus being maſters of the Lacedæmonian ſea, ſailed round the iſlands and coaſts of Aſia, taking the cities there which had been reduced by the Lacedæmonians. Saitos and Abydos only held out, and reſiſted the utmoſt efforts of the enemy, tho' they had been beſieged both by ſea and land.

Next year, Conon having aſſembled a powerful fleet, again took Pharnabazus on board, and reduced the iſland of Melos, from whence he made a deſcent on the coaſts of Lyconia, pillaging all the maritime provinces, and loading his fleet with an immenſe booty. After this, Conon obtained leave of him to repair to Athens with 80 ſhips and 50 talents, in order to rebuild the walls of that city; having firſt convinced Pharnabazus, that nothing could more effectually contribute to the weakening of the power of Sparta than putting Athens again in a condition to rival its power. He no ſooner arrived at Piræus the port of Athens, but he began to work; which, as he had a great number of hands, and was ſeconded by the zeal of all thoſe that were well inclined to the Athenians, was ſoon completed, and the city not only reſtored to its former ſplendour, but rendered more formidable than ever. The Lacedæmonians were now reduced to the neceſſity of accepting ſuch terms of peace as they could procure. The terms were, that all the Greek cities in Aſia ſhould be ſubject to the king of Perſia, as alſo the iſlands of Cyprus and Clazomena; that the iſlands of Scyros, Lemnos, and Imbros, ſhould be reſtored to the Athenians, and all the cities of Greece, whether ſmall or great, ſhould be declared free; and by the ſame treaty Artaxerxes engaged to join thoſe who accepted the terms he propoſed, and to aſſiſt them to the utmoſt of his power againſt ſuch as ſhould rejeſt them.

Artaxerxes, being now diſengaged from the Grecian war, turned his arms againſt Evagoras king of Cyprus. This man was deſcended from the ancient kings of Salamine, the capital city of the iſland of Cyprus. His anceſtors had held that city for many ages in quality of ſovereigns; but were at laſt driven out by the Perſians, who, making themſelves maſters of the whole iſland, reduced it to a Perſian province. Evagoras, however, being a man of an enterpriſing genius, ſoon became weary of living in ſubjection to a foreign power, drove out the Perſian governor, and recovered his paternal kingdom. Artaxerxes attempted to drive him out of it; but, being diverted by the Greek war, was obliged to put off the enterpriſe. However, Conon, by means of Cleſias chief phyſician to Artaxerxes, got all differences accommodated, and Artaxerxes promiſed not to moleſt him in the poſſiſſion of his ſmall kingdom. But Evagoras ſoon becoming

discontented with such a narrow possession, gradually reduced under his subjection almost the whole of the island. Some, however, there were who held out against him, and these immediately applied to Artaxerxes for assistance; and he, as soon as the war with Greece was at an end, bent all his force against Evagoras, intending to drive him quite out of the island. The Athenians, however, notwithstanding the favours lately conferred upon them by the king of Persia, could not forbear assisting their old ally in such a dreadful emergency. Accordingly, they sent him ten men of war under the command of Philocrates; but the Lacedæmonian fleet, commanded by Talentias brother to Agefilas, falling in with them near the isle of Rhodes, surrounded them so that not one ship could escape. The Athenians, determined to assist Evagoras at all events, sent Chabrias with another fleet and a considerable body of land-forces; and with the assistance of these he quickly reduced the whole island. But in a short time, the Athenians being obliged, in consequence of the treaty concluded with the Persians, to recall Chabrias, Artaxerxes attacked the island with an army of 300,000 men, and a fleet of 300 ships. Evagoras applied to the Egyptians, Libyans, Arabians, Tyrians, and other nations, from whom he received supplies both of men and money; fitting out a fleet with which he ventured an engagement with that of Artaxerxes. But being defeated, and obliged to shut himself up in Salamine, he was closely besieged by sea and land. Here at last he was obliged to capitulate, and abandon to the Persians the whole of the island except Salamine, which he held as a king tributary to Artaxerxes.

35
Unsuccessful
expeditions
against the
Cadusians
and Egyptians.

The Cyprian war being ended, Artaxerxes turned his arms against the Cadusians, whose country lay between the Euxine and Caspian Seas. But these nations were too well accustomed to war to be overcome by the Persians; and therefore the king was obliged to abandon the project, after having lost a great number of his troops and all the horses which he took out with him. In his Egyptian expedition, which happened immediately after the Cadusian war, he was attended with little better success; which, however, was owing to the bad conduct of his general Pharnabazus. This commander being entrusted with the management of the Egyptian war, sent an ambassador to Athens, complaining that Chabrias had engaged in the service of an enemy of the king of Persia, with whom the state of Athens was in alliance, and threatening the republic with his master's resentment if proper satisfaction was not given: at the same time he demanded Iphicrates, another Athenian, and the best general of his time, to command the Greek mercenaries in the Persian service. This the Athenians complied with; and Iphicrates having mustered his troops, so exercised them in all the arts of war, that they became afterwards very famous among the Greeks under the name of *Iphicratean soldiers*. Indeed he had sufficient time to instruct them; for the Persians were so slow in their preparations, that two whole years elapsed before they were ready to take the field. At the same time Artaxerxes, that he might draw the more mercenaries out of Greece, sent ambassadors to the different states in it, declaring it to be his will and pleasure that they should live at peace with each other, on the terms of

the treaty lately concluded: which declaration was received with pleasure by all the states except Thebes, who aspired at the sovereignty of Greece; and accordingly refused to conform to it. All things, however, at last being ready for the expedition, the troops were mustered at the city then called *Ace*, and since *Ptolemais*; where they were found to consist of 200,000 Persians under the command of Pharnabazus, and 20,000 Greeks led by Iphicrates. The fleet consisted of 300 galleys, besides a vast number of other vessels which followed with provisions. The fleet and army began to move at the same time; and that they might act in concert, they separated as little as possible. It was proposed, that the war should begin with the siege of Pelusium; but Nectanebis, the revolted king of Egypt, had provided so well for the defence of the place, that it was thought expedient to drop the enterprise, and make a descent at one of the mouths of the Nile. In this they succeeded; for the Egyptians not expecting them at that place, had not taken such care to fortify it as at Pelusium. The fortrefs of consequence was easily taken, and all the Egyptians in it put to the sword. After this, Iphicrates was for embarking the troops without loss of time, and attacking Memphis the capital of Egypt. Had this opinion been followed before the Egyptians recovered from the consternation into which they were thrown, it is highly probable that the whole country might have been reduced at once; but Pharnabazus would undertake nothing before the rest of the forces were come up. Iphicrates then, in the utmost vexation at losing so favourable an opportunity, pressed Pharnabazus to allow him to attack the place with the Greek mercenaries only; but he refused this also, from a mean jealousy of the honour which Iphicrates might acquire; and in the mean time the Egyptians recovered sufficient courage to put themselves in such a posture of defence that they could not be attacked with any probability of success; and at the same time the Nile overflowing as usual, obliged them to return to Phœnice. The expedition was again undertaken 12 years after, but without success.

The last years of the reign of Artaxerxes were greatly disturbed by dissensions in his family; which at last broke his heart, and he died in the 94th year of his age, and 46th of his reign. He was succeeded by one of his sons named *Ochus*, who behaved with such cruelty, that almost one half of his dominions revolted as soon as he came to the throne. But, by reason of the dissensions of the rebels among themselves, all of them were reduced, one after another; and among the rest, the Sidonians, finding themselves betrayed, burnt themselves to the number of 40,000, together with their wives and children.

Ochus, having quelled all the insurgents, immediately set himself about reducing Egypt, and for this purpose procured a reinforcement of other 10,000 mercenaries from Greece. On his march, he lost a great number of his men drowned in the lake Serbonis, which lies between Phœnice and Egypt, extending about 30 miles in length. When the south wind blows, the whole surface of this lake is covered with sand, in such a manner that no one can distinguish it from the firm land. Several parties of Ochus's army were lost in it for want of proper guides; and it is said that

36
Ochus succeeds Artaxerxes.

37
Reduces Egypt.

Persia.

that whole armies have sometimes perished in the same place. When he arrived in Egypt, he detached three bodies to invade the country in different parts; each being commanded by a Persian and a Greek general. The first was led by Lachares the Theban, and Rofaces governor of Lydia and Ionia; the second by Nicoftratus the Theban and Ariftazanes; the third by Mentor the Rhodian and Bagoas an eunuch. The main body of the army he kept with himself, and encamped near Pelufium, with a defign to watch the events of the war there. The event was fuccefful, as we have related under the article EGYPT; and Ochus having reduced the whole country, difmantled their ftrong-holds, plundered the temples, and returned to Babylon loaded with booty.

The king, having ended this war with fuch fuccefs, conferred very high rewards on his mercenaries and others who had diftinguifhed themfelves. To Mentor the Rhodian he gave 100 talents, and other prefents to a great value; appointing him alfo governor of all the coafts of Afia, and committing to his care the whole management of the war which he was ftill carrying on againft fome provinces that had revolted in the beginning of his reign; and all thefe either by ftatagems, or by force, he at laft reduced; reftoring the king's authority in all thefe places.—Ochus then, finding himfelf free from all troubles, gave his attention to nothing but his pleasures, leaving the adminiftration of affairs entirely to Bagoas the eunuch, and to Mentor. Thefe two agreed to fhare the power between them; in confequence of which the former had the provinces of Upper Afia, and the latter all the reft. Bagoas, being by birth an Egyptian, had a great zeal for the religion of his country, and endeavoured, on the conqueft of Egypt, to influence the king in favour of the Egyptian ceremonies; but, in fpite of all his endeavours, Ochus not only refufed to comply, but killed the facred bull, the emblem of the Egyptian god Apis, plundered the temples, and carried away their facred records. This Bagoas fupposed to be the high-eft guilt which a human creature could commit; and therefore poifoned his mafter and benefactor in the 21ft year of his reign. Nor did his revenge ftop here; for he kept the king's body, caufing another to be buried in its ftead; and becaufe the king had caufed his attendants eat the flefh of Apis, Bagoas cut his body in pieces, and gave it fo mangled to be devoured by cats, making handles for fwords of his bones. He then placed Arfes the youngelt of the deceased king's fons on the throne, that he might the more eafily preferve the whole power to himfelf.

Arfes did not long enjoy even the fhadow of power which Bagoas allowed him, being murdered in the fecond year of his reign by that treacherous eunuch, who now conferred the crown on Darius Codomannus, a diftant relation of the royal family. Neither did he incline to let him enjoy the crown much longer than his predecessor; for, finding that he could not fuffer himfelf to be guided by him in all things, the treacherous Bagoas brought him a poifonous potion; but Darius got rid of him by his own artifice, caufing him to drink the poifon which he brought. This eftablifhed Darius in the throne as far as fecurity from internal enemies could do fo; but in a very little time his dominions were invaded, and, we may fay, the fame

moment conquered by Alexander the Great. The particulars of that hero's conquefts are related under the article MACEDON; we fhall therefore here only take notice of the fate of Darius himfelf, with which the Persian empire concluded for many ages. After the battle of Arbela, which was decifive in favour of Alexander, the latter took and plundered Perfeopolis, from whence he marched into Media, in order to purfue Darius, who had fled to Ecbatan the capital of that province. This unhappy prince had ftill an army of 30,000 foot, among whom were 4000 Greeks, who continued faithful to the laft. Befides, thefe he had 4000 flingers, and 3000 horfe, moft of them Bactrians, and commanded by Belfus governor of Bactria.—When Darius heard that Alexander was marched to Ecbatan, he retired into Bactria, with a defign to raife another army; but foon after, changing his mind, he determined to venture a battle with the forces he ftill had left. On this Belfus governor of Bactria, and Nabarzanes a Persian lord of great diftinction, formed a confpiracy againft him, propofing to feize his perfon, and; if Alexander purfued them, to gain his friendfhip and protection by betraying their mafter into his hands; but if they efaped, their defign was to murder him and ufurp the crown. The troops were eafily gained over, by reprefenting to them the defperate fituation of Darius's affairs; but Darius himfelf, though informed of their proceedings, and foli-cited to truft his perfon among the Greeks, refufed to give credit to the report, or follow fuch a falutary counfel. The confequence of this was, that he was in a few days feized by the traitors; who, out of refpect to the royal dignity, bound him with golden chains, and fhutting him up in a covered cart, fled with him towards Bactria. The cart was covered with fkins, and ftangers appointed to drive it, without knowing who the prifoner was. Belfus was proclaimed commander in chief in the room of Darius by the Bactrian horfe; but Artabazus and his fons, with the forces they commanded, and the Greeks, under the command of one *Patron*, retired from the body of the army under Belfus, and marched over the mountains towards Parthiene. In the mean time Alexander arriving at Ecbatan, was informed that Darius had left the place five days before. He then difpatched orders to Clitus, who had fallen fick at Sufa, to repair, as foon as he recovered, to Ecbatan, and from thence to follow him into Parthia with the cavalry and 6000 Macedonians who were left in Ecbatan. Alexander himfelf with the reft of the army purfued Darius; and the 11th day arrived at *Rhages*, having marched in that fpace of time 3300 furlongs. Moft of thofe who accompanied him died through the fatigue of fo long a march; infomuch that, on his arrival at Rhages, he could fcarce mufter 60 horfemen. Finding that he could not come up with Darius, who had already paffed the Cafpian ftraits, he ftaid five days at Rhages, in order to refrefh his army and fettle the affairs of Media. From thence he marched into Parthia, and encamped at a fmall diftance from the Cafpian ftraits, which he paffed the next day without oppofition. He had fcarce entered Parthia, when he was informed that Belfus and Nabarzanes had confpired againft Darius, and defigned to feize him. Hereupon, leaving the main body of the army behind with Craterus, he

Persia.

40

Persia con-
quered by
Alexander
the Great.

47

Darius sei-
zed by his
own fuba-
jects.

38
Ochus mur-
dered by
Bagoas.

39
Darius Co-
domannus.

advan-

Persia.

advanced with a small troop of horse lightly armed; and having marched day and night without ever halting, except for a few hours, he came on the third day to a village where Bessus with his Bactrians had encamped the day before. Here he understood that Darius had been seized by the traitors; that Bessus had caused him to be shut up in a close cart, which he had sent before, that he might be the more sure of his person; and that the whole army except Artabazus and the Greeks, who had taken another rout, obeyed Bessus. Alexander therefore taking with him a small body of light-armed horse, for the others could not possibly proceed further, at last came in sight of the barbarians, who were marching in great confusion. His unexpected appearance struck them, though far superior in number, with such terror, that they immediately betook themselves to flight; and because Darius refused to follow them, Bessus and those who were about him discharged their darts at the unfortunate prince, leaving him wallowing in his blood. After this they all fled different ways, and were pursued with great slaughter by the Macedonians. In the mean time the horses that drew the cart in which Darius was, stopping of their own accord, for the drivers had been killed by Bessus, near a village about four furlongs from the highway. Thither Polystratus a Macedonian, being pressed with thirst in the pursuit of the enemy, was directed by the inhabitants to a fountain to refresh himself, not far from the place where they stopped. As he was filling his helmet with water he heard the groans of a dying man; and looking round him, discovered a cart with a team of horses, unable to move by reason of the many wounds they had received. When he drew near he perceived Darius lying in the cart, and very near his end, having several darts sticking in his body. However, he had strength enough left to call for some water, which Polystratus readily brought him. Darius, after drinking, turned to the Macedonian, and with a faint voice told him, that, in the deplorable state to which he was reduced, it was no small comfort to him that his last words would not be lost: he then charged him to return his hearty thanks to Alexander for the kindness he had shewn to his wife and family, and to acquaint him, that, with his last breath, he besought the gods to prosper him in all his undertakings, and make him sole monarch of the universe. He added, that it did not so much concern him as Alexander to pursue and bring to condign punishment those traitors who had treated their lawful sovereign with such cruelty, that being the common cause of all crowned heads. Then, taking Polystratus by the hand, "Give Alexander your hand, says he, as I give you mine, and carry him, in my name, the only pledge I am able to give, in this condition, of my gratitude and affection." Having uttered these words, he expired in the arms of Polystratus. Alexander coming up a few minutes after, bewailed his death, and caused his body to be interred with the highest honours. The traitor Bessus being at last reduced to extreme difficulties, was delivered up by his own men naked and bound into the hands of the Macedonians; on which Alexander gave him up to Oxathres the brother of Darius, to suffer what punishment he should think proper. Plutarch tells us that he was executed in the following manner: Several

trees being by main force bent down to the ground, and one of the traitor's limbs tied to each of them, the trees, as they were suffered to return to their natural position, flew back with such violence, that each carried with it the limb that was tied to it.

Thus ended the empire of Persia, 209 years after it had been founded by Cyrus. After the death of Alexander the Persian dominions became subject to Seleucus Nicator, and continued subject to him for 62 years, when the Parthians revolted, and conquered the greatest part of them. To the Parthians they continued subject for 475 years; when the sovereignty was again restored to the Persians, as related under the article PARTHIA.

The restorer of the Persian monarchy was Artaxerxes, or Artaxares, who was not only a private person, but of spurious birth. However, he possessed great abilities, by which means he executed his ambitious projects. He was no sooner seated on the throne than he took the pompous title of *king of kings*, and formed a design of restoring the empire to its ancient glory. He therefore gave notice to the Roman governors of the provinces bordering on his dominions, that he had a just right, as the successor of Cyrus, to all the Lesser Asia; which he therefore commanded them immediately to quit, as well as the provinces on the frontiers of the ancient Parthian kingdom, which were already his. The consequence of this was a war with Alexander Severus the Roman emperor. Concerning the event of this war there are very different accounts. It is certain, however, that, on account of his exploits against Artaxares, Alexander took the titles of *Parthicus* and *Persicus*; though, it would seem, with no great reason, as the Persian monarch lost none of his dominions, and his successors were equally ready with himself to invade the Roman territories.

Artaxares dying after a reign of 12 or 15 years, was succeeded by his son Sapor; a prince of great abilities both of body and mind, but fierce, haughty, untractable, and cruel. He was no sooner seated on the throne than he began a new war with the Romans. In the beginning he was unsuccessful; being obliged by the young emperor Gordian, to withdraw from the Roman dominions, and was even invaded in his turn; but, in a short time, Gordian being murdered by Philip, the new emperor made peace with him upon terms very advantageous to the Persians. He was no sooner gone than Sapor renewed his incursions, and made such alarming progress, that the emperor Valerian, at the age of 70, marched against him in person with a numerous army. An engagement ensued, in which the Romans were defeated and Valerian taken prisoner. Sapor pursued his advantages with such insolence of cruelty, that the people of the provinces took arms, first under Callistus a Roman general, and then under Odenatus prince of Palmyrene. Thus they not only protected themselves from the insults of the Persians, but even gained many great victories over them, and drove Sapor with disgrace into his own dominions. In his march he is said to have made use of the bodies of his unfortunate prisoners to fill up the hollow roads, and to facilitate the passage of his carriages over such rivers as lay in his way. On his return to Persia, he was solicited by the kings of the Cadusians, Armenians, Bactrians, and other nations, to set Valerian at liberty;

Persia.

44
Revolt of the Parthians.

45
Persian empire restored by Artaxares.

46
And murdered.

47
His murderers murdered.

48
Succeeded by Sapor, who takes Valerian the Roman emperor prisoner.

but

Perſia.
47
and treats
imprudently.

but to no purpoſe. On the contrary, he uſed him the worſe; treated him daily with indignities, ſet his foot upon his neck when he mounted his horſe, and, as is affirmed by ſome, ſlayed him alive after ſome years confinement; and cauſed his ſkin to be tanned, which he kept as a monument of his victory over the Romans. This extreme inſolence and cruelty was followed by an uninterrupted courſe of miſfortune. Odenatus defeated him in every engagement, and even ſeemed ready to overthrow his empire; and after him Aurelian took ample vengeance for the captivity of Valerian. Sapor died in the year of Chriſt 273, after having reigned 31 years; and was ſucceeded by his ſon Hormiſdas, and he by Varanes I. Concerning both theſe princes we know nothing more than that the former reigned a year and ten days, and the latter three years; after which he left the crown to Varanes II. who ſeems to have been ſo much awed by the power of the Romans, that he durſt undertake nothing. The reſt of the Perſian hiſtory, to the overthrow of the empire by the Saracens, affords nothing but an account of their continued invaſions of the Roman empire, which more properly belongs to the hiſtory of Rome; and to which therefore we refer. The laſt of the Perſian monarchs of the line of Artaxares, was Iſdigerdes, or Jeздегерд, as he is called by the Arabian and Perſian hiſtorians, who was cotemporary with Omar the ſecond caliph after Mahomet. He was ſeate on the throne, when he found himſelf attacked by a powerful army of Saracens under the command of one Sad, who invaded the country through Chaldaea. The Perſian general took all imaginable pains to harraſs the Arabs on their march; and having an army ſuperior to them in numbers, employed them continually in ſkirmiſhes; which were ſometimes favourable to him, and ſometimes otherwiſe. But Sad, perceiving that this lingering war would deſtroy his army, determined to haſten forward, and force the enemy to a general engagement. The Perſians declined this for a long time; but at length, finding a convenient plain where all their forces might act, they drew up in order of battle, and reſolved to wait for the Arabs. Sad having diſpoſed his men in the beſt order he could, attacked the Perſians with the utmoſt fury. The battle laſted three days and three nights; the Perſians retiring continually from one poſt to another, till at laſt they were entirely defeated; and thus the capital city, and the greateſt part of the dominions of Perſia, fell into the hands of the Arabs. The conquerors ſeized the treaſures of the kings; which were ſo vaſt, that, according to a Mahometan tradition, their prophet gave the Saracen army a miraculous view of thoſe treaſures before the engagement, in order to encourage them to fight.

After the loſs of this battle, Jeздегерд retired into Choraſſan, where he maintained himſelf as king, having under his ſubjection two other provinces, named *Kerman* and *Segeſſan*. But after he had reigned in this limited manner for 19 years, one of the governors of the ſecond towns he had left betrayed it, and called in the Turks. This place was called *Merou*, ſeated on the river Gihon or Odus. Jeздегерд immediately marched againſt the rebels and their allies. The Perſians were defeated; and the unfortunate monarch, having with much difficulty reached the river, found there a little boat, and a fiſherman to whom it belong-

ed. The king offered him a bracelet of precious ſtones; but the fellow, equally brutal and ſtupid, told him that his fare was five farthings, and that he would neither take more nor leſs. While they diſputed, a party of the rebel horſe came up, and knowing Jeздегерд, killed him in the year 652.

Jeздегерд left behind him a ſon named *Firouz*, and a daughter named *Dara*. The latter eſpouſed Boſtenay, whom the rabbinical writers have dignified with the title of the *head of the captivity*; and who, in fact, was the prince of the Jews ſettled in Chaldaea. As for *Firouz*, he ſtill preſerved a little principality; and when he died, left a daughter named *Mah Afrid*, who married Walid the ſon of the caliph Abdalmalek, by whom he had a ſon named *Tezid*, who became caliph, and conſequently ſovereign of Perſia; and ſo far was this prince from thinking himſelf above claiming the title derived from his mother, that he conſtantly ſtyled himſelf the *ſon of Khofrou king of Perſia, the deſcendant of the caliph Marwan, and among whoſe anceſtors on the ſide of the mother were the Roman emperor and the khacan*.

Perſia continued to be ſubject to the Arabs till the decline of the Saracen empire, when it was ſeized by various uſurpers, till the time of Jenghiz Khan, who conquered it as well as almoſt all the reſt of Aſia. After his death, which happened in the year 1227, Perſia, together with the neighbouring countries, were governed by officers appointed by his ſucceſſors, who reigned at Keraſakom, in the eaſtern parts of Tartary, till the year 1253, when it became once more the feat of a mighty empire under Hulaku the Mogul, who in 1256 aboliſhed the caliphate, by taking the city of Bagdad, as related under that article. After the death of Hulaku, his ſon Abaka ſucceeded to his extenſive dominions; and his firſt care was to ſhut up all the avenues of his empire againſt the other princes of the race of Jenghiz Khan, who reigned in different parts of Tartary. His precautions, however, were of little avail; for, in the very beginning of his reign, he was invaded by Barkan Khan, of the race of Jagatay the ſon of Jenghiz Khan, from Great Bukharia, with an army of 300,000 men. Abaka was but indifferently prepared to oppoſe ſuch a formidable power; but, happily for him, his antagoniſt died before the armies came to an engagement, upon which the invaders diſperſed and returned to Tartary. In the year 1264, Armenia and Anatolia were ravaged by the Mamlucks from Egypt, but were obliged to fly from Abaka; who thus ſeemed to be eſtabliſhed in the poſſeſſion of an empire almoſt as extenſive as that of the ancient Perſian kings. His tranquillity, however, was of ſhort duration; for, in 1268, his dominions were invaded by Borak Khan, a prince likewiſe of the race of Jagatay, with an army of 100,000 men. He quickly reduced the province of Choraſſan, where he met with little oppoſition, and, in 1269, advanced as far as Aderbijan, where Abaka had the bulk of his forces. A bloody battle enſued; in which Abaka was victorious, and Borak obliged to fly into Tartary, with the loſs of all his baggage and great part of his army. Abaka died in 1282, after a reign of 17 years, not without ſuſpicion of being poiſoned; and was ſucceeded by his brother Ahmed Khan. He was the firſt of the family of Jenghiz Khan who embraced Mahometaniſm; but neither he nor his ſucceſſors appear to have been in the leaſt verſed in the

Perſia.

49
State of
Perſia under
the Mogul
princes.

Perſia. arts of government; for the Perſian hiſtory, from this period, becomes only an account of infurrections, murders, rebellions, and poiſonings, till the year 1335, when it ſplit all to pieces, and was poſſeſſed by a great number of petty princes; all of whom were at perpetual war with each other till the time of Timur Beg, or Tamerlane, who once more reduced them all under one jurifdiction.

50
Under Tamerlane and his ſucceſſors.

After the death of Tamerlane, Perſia continued to be governed by his ſon Shah Rukh, a wife and valiant prince; but, immediately after his death, fell into the ſame conſuſion as before; being held by a great number of petty tyrants, till the beginning of the 16th century, when it was conquered by Shah Iſmael Saſi, or Seſi; of whoſe family we have the following account. His father was Sheykh Hayder or Haydr, the ſon of Soltan Juneyd, the ſon of Sheykh Ibrahim, the ſon of Sheykh Ali, the ſon of Sheykh Muſa, the ſon of Sheykh Seſi, who was the 13th in a direct line from Ali the ſon-in-law of the prophet Mahomet. When Tamerlane returned from the defeat of Bajazet the Turkiſh ſultan, he carried with him a great number of captives out of Karamania and Anatolia, all of whom he intended to put to death on ſome remarkable occaſion; and with this reſolution he entered Ardebil, or Ardevil, a city of Aderbijan, about 25 miles to the eaſt of Tauris, where he continued for ſome days. At this time lived in that city the Sheykh Saſi or Seſi abovementioned, reputed by the inhabitants to be a ſaint; and, as ſuch, much revered by them. The fame of Saſi's ſanctity ſo much moved Tamerlane, that he paid him frequent viſits; and, when he was about to depart, promiſed to grant whatever favour he ſhould aſk. Sheykh Saſi, who had been informed of Tamerlane's deſign to put the captives to death, requeſted of the conqueror that he would ſpare the lives of thoſe unfortunate men. Tamerlane, deſirous of obliging him, not only granted this requeſt, but delivered them up to him to be diſpoſed of as he thought fit; upon which the Sheykh furniſhed them with cloaths and other neceſſaries as well as he could, and ſent them home to their reſpective countries. This generous action proved very beneficial to the family; for the people were ſo much affected with ſuch an extraordinary inſtance of virtue, that they repaired in great numbers to Saſi, bringing with them conſiderable preſents; and this ſo frequently, that few days paſſed in which he was not viſited by many. Thus the descendants of the Sheykh made a conſpicuous figure till the year 1486, when they were all deſtroyed by the Turkſmans except Iſmael, who fled to Ghilan, where he lived under the protection of the king of that country; after which he became conſpicuous on the following occaſion.

There was at that time, among the Mahometans, a vaſt number of people diſperſed over Aſia; and among theſe a particular party who followed that of Haydr the father of Iſmael, which Sheykh Saſi, one of his anceſtors, had brought into great reputation. Iſmael, who had aſſumed the ſurname of *Saſi*, or *Sage*, finding that Perſia was all in conſuſion, and hearing that there was a great number of the Hayderian ſect in Karamania, removed thither. There he collected 7000 of his party, all devoted to the intereſt of his family; and while he was yet only 14 years of age, conquered Shirwan. After this he purſued his con-

queſts; and as his antagoniſts never united to oppoſe him, had conquered the greateſt part of Perſia, and reduced the city of Bagdad by the year 1510. However, his conqueſts on the weſt ſide were ſoon ſtopped by the Turks; for, in 1511, he received a great defeat from Salem I. who took Tauris; and would probably have cruſhed the empire of Iſmael in its infancy, had he not thought the conqueſt of Egypt more important than that of Perſia. After his defeat by Selim, Iſmael never undertook any thing of conſequence. He died in 1523, leaving the crown to his eldeſt ſon Tahmaſp I.

The new Shah was a man of very limited abilities, and was therefore invaded by the Turks almoſt inſtantly on his acceſſion to the throne. However, they were obliged to retreat by an inundation, which overflowed their camp, and which frightened them with its red colour, probably ariſing from the nature of the ſoil over which it paſſed. Thamaſp, however, reduced Georgia to a province of the Perſian empire; that country being in his time divided among a number of petty princes, who, by reaſon of their diviſions, were able to make little oppoſition.

The reigns of the ſucceeding princes afford nothing remarkable till the time of Shah Abbas I. ſurnamed the Great. He aſcended the throne in the year 1584; and his firſt care was to recover from the Turks and Tartars the large provinces they had ſeiſed which formerly belonged to the Perſian empire. He began with declaring war againſt the latter, who had ſeiſed the fineſt part of Choraſſan. Accordingly, having raiſed a powerful army, he entered that province, where he was met by Abdallah Khan the chief of the Uſbeck Tartars. The two armies lay in fight of each other for ſix months; but at length Abbas attacked and defeated his enemies, forcing them, for that time, to abandon Choraſſan. Here he continued for three years; and on his leaving that place, fixed the ſeat of government at Iſpahan, where it has continued ever ſince. His next expedition was againſt the Turks. Underſtanding that the gariſon of Tauris were in no expectation of an enemy, he formed a deſign of ſurpriſing the place; and, having privately aſſembled a few forces, he marched with ſuch celerity, that he reached a paſs called *Shibli*, very near Tauris, in ſix days, tho' it is uſually 18 or 20 days journey for the caravans. Here the Turks had poſted a few ſoldiers, rather for the purpoſe of collecting the cuſtoms on ſuch commodities as were brought that way, than of defending the paſs againſt an enemy. Before they came in fight of this paſs, Abbas and ſome of his officers left the reſt of the army, and rode briskly up to the turnpike. Here the ſecretary of the cuſtom-houſe, taking them for merchants, demanded the uſual duties. Abbas replied, that the perſon who had the purſe was behind, but at the ſame time ordered ſome money to be given him. But while the ſecretary was counting it, he was ſuddenly ſtabbed by the Shah's order; and the officers who were with him ſuddenly falling upon the few ſoldiers who were there, obliged them to ſubmit; after which he entered the paſs with his army. The governor of Tauris marched out with all the troops he could collect on ſo ſhort a warning; but being inferior to the Perſians, he was utterly defeated, and himſelf taken priſoner; after which the city was obliged to ſubmit,

52
Reign of Shah Abbas the Great.

51
Conquered by Iſmael Saſi.

submit, as also a number of places in the neighbourhood. One city only, called *Orumi*, being very strongly situated, resisted all the efforts of Abbas; but was at last taken by the assistance of the Kurds, whom he gained over by promising to share the plunder of the place with them. But instead of this, he formed a design to cut them all off at once; fearing that they might at another time do the Turks a service of the same nature that they had done to him just now. For this reason he invited their chiefs to dine with him; and having brought them to a tent, the entrance to which had several turnings; and on the inside were stationed two executioners, who cut off the heads of the guests as soon as they entered.

After this Shah Abbas considerably enlarged his dominions, and repelled two dangerous invasions of the Turks. He attempted also to promote commerce, and civilise his subjects; but stained all his great actions by his abominable cruelties, which he practised on every one who gave him the least cause of offence; nay, frequently without any cause at all. He took the Isle of Ormus from the Portuguese, who had kept it since 1507, by the assistance of some English ships in 1622; and died six years after, aged 70.

The princes who succeeded Shah Abbas the Great, were remarkable only for their cruelties and debaucheries, which occasioned a revolution in 1716, when the Shah Huseyn was dethroned by the Afghans, a people inhabiting the country between Persia and India; who being oppressed by the ministers, revolted under the conduct of one Mereweis. The princes of the Afghan race continued to enjoy the sovereignty for no more than 16 years, when Afhratt the reigning Shah was dethroned by one of his officers. On this Tahamasp, otherwise called *Prince Thomas*, the only survivor of the family of Abbas, assembling an army, invited into his service Nadir Khan, who had obtained great reputation for his valour and conduct. He was the son of a Persian nobleman, on the frontiers of Usbeck Tartary; and his uncle, who was his guardian, keeping him out of possession of the castle and estate, which was his inheritance, he took to robbing the caravans; and, having increased his followers to upwards of 500 men, became the terror of that part of the country, and especially of his uncle, who had seized his estate. His uncle therefore resolved to make his peace with him, and with that view invited him to the castle, where he entertained him in a splendid manner; but Nadir Khan ordered his throat to be cut next night, and all his people to be turned out of the castle. No sooner had Nadir Khan got the command of the Persian army, than he attacked and defeated the usurper Efriss, put him to death, and recovered all the places the Turks and Russians had made themselves masters of during the rebellion; and then prince Thomas seemed to be established on the throne: but Nadir Khan, to whom Thomas had given the name of *Thamas Kouli Khan*, that is, *the Slave of Thomas*, thinking his services not sufficiently rewarded, and pretending that the king had a design against his life, or at least to set him aside, conspired against his sovereign, and put him to death, as is supposed: after which, he usurped the throne, styling himself *Shah Nadir*, or *King Nadir*.

He afterwards laid siege to Candahor, of which a

son of Mereweis had possessed himself. While he lay at this siege, the court of the Great Mogul being distracted with factions, one of the parties invited Shah Nadir to come to their assistance, and betrayed the Mogul into his hands. He thereupon marched to Delhi, the capital of India, and summoned all the viceroys and governors of provinces to attend him, and bring with them all the treasures they could raise, and those that did not bring as much as he expected, he tortured and put to death. Having thus amassed the greatest treasure that ever prince was master of, he returned to Persia, giving the Mogul his liberty, on condition of his resigning the provinces on the west side of the Indus to the crown of Persia. He afterwards made a conquest of Usbeck Tartary, and plundered Bochara the capital city. Then he marched against the Dagistan Tartars; but lost great part of his army in their mountains, without fighting. He defeated the Turks in several engagements; but laying siege to Bagdad, was twice compelled to raise the siege. He proceeded to change the religion of Persia to that of Omar, hanged up the chief priests, put his own son to death, and was guilty of such cruelty, that he was at length assassinated by his own relations, anno 1747. A contest upon this ensued between these relations for the crown; which continued for several years, and made Persia a dreadful scene of confusion, bloodshed, and devastation: but at last fortune declared in favour of Kerim Khan, who was crowned in the month of October 1763, at Tauris.

As to the air and climate of this country, considering the great extent thereof, it cannot but be very different, according to the situation of its several parts; some being frozen with cold, whilst others are burnt with heat at the same time of the year. The air, wherever it is cold, is dry; but, where it is extremely hot, it is sometimes moist. All along the coast of the Persian Gulph, from west to east, to the very mouth of the river Indus, the heat for four months is so excessive, that even those who are born in the country, unable to bear it, are forced to quit their houses, and retire to the mountains; so that such as travel in these parts, at that season, find none in the villages but wretched poor creatures, left there to watch the effects of the rich, at the expence of their own health. The extreme heat of the air, as it is insupportable, so it makes it prodigiously unwholesome; strangers frequently falling sick there, and seldom escaping. The eastern provinces of Persia, from the river Indus to the borders of Tartary, are subject to great heats, though not quite so unwholesome as on the coasts of the Indian Ocean and the Persian Gulph; but in the northern provinces, on the coast of the Caspian Sea, the heat is full as great, and, though attended with moisture, as unwholesome as on the coast before mentioned. From October to May, there is no country in the world more pleasant than this; but the people carry indelible marks of the malign influence of their summers, looking all of them of a faint yellow, and having neither strength nor spirits; though, about the end of April, they abandon their houses, and retire to the mountains, which are 25 or 30 leagues from the sea. But this moistness in the air is only in these parts: the rest of Persia enjoys a dry air, the sky being perfectly serene, and hardly so much as a cloud seen to fly there-

Perfia. in. Though it seldom rains, it does not follow that the heat admits of no mitigation; for in the night, notwithstanding there is not a cloud to be seen, and the sky is so clear, that the stars alone afford a light sufficient to travel by, a brisk wind springs up, which lasts until within an hour of the morning, and gives such a coolness to the air, that a man can dispense with a tolerable warm garment. The seasons in general, and particularly in the middle of this kingdom, happen thus: the winter, beginning in November, and lasting until March, is very sharp and rude, attended with frost and snow; which last descends in great flakes on the mountains, but never in the plains. There are mountains, three days journey to the west of Spauhawn, or Isfahan, on which the snow lies for eight months in the year. From the month of March to that of May there are brisk winds; from May to September the air is serene and dry, refreshed by pleasant gales, which blow in the night, at evening and morning; and in September and November the wind blows as in the spring. The great drinels of the air exempt Persia from thunder and earthquakes. In the spring, indeed, there sometimes falls hail; and, as the harvest is then pretty far advanced, it does a great deal of mischief. The rainbow is seldom seen in this country, because there rise not vapours sufficient to form it; but in the night there are seen rays of light shooting thro' the firmament, and followed as it were by a train of smoke. The winds, however brisk, seldom swell into storms or tempests; but, on the other hand, they are sometimes poisonous and infectious on the shore of the Gulph, as all travellers agree. Mr Tavernier says, that at Gomeroon people often find themselves struck by a south wind, in such a manner that they cry, "I burn;" and immediately fall down dead. M. le Brun tells us, that he was assured while he was there, that the weather was sometimes so excessively sultry as to melt the seals of letters. At this time the people go in their shirts, and are continually sprinkled with cold water; and some even lie several hours naked in the water. Among the inconveniences consequent from this malign disposition of the air, one of the most terrible is the engendering, in the arms and legs, a kind of long small worms, which cannot be extracted without great danger of breaking them; upon which a mortification ensues.

55
Soil.

The soil of Persia is in general stony, sandy, barren, and every where so dry, that, if it be not watered, it produces nothing, not even grass; but, where they can turn the water into their plains and valleys, it is not unfruitful. There is a great difference in point of fertility, in the different provinces of the empire; and those of Media, Iberia, Hyrcania, and Bactria, are now, in a great measure, what they were formerly, and surpass most of the others in their productions. All along the Persian Gulph, the soil is still more barren, cattle less plenty, and every thing in a worse condition than any where else.

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Produce,
&c.

Though there is scarce a province in Persia which does not produce wine, yet the wine of some provinces is much more esteemed than that of others; but Schiras wine is universally allowed to be the very best in Persia: infomuch, that it is a common proverb there, That to live happily one must eat the bread of Yezd, and drink the wine of Schiras.

The grain most common in Persia is wheat; which is wonderfully fair and clean. As for barley, rice, and millet, they only make bread of them in some places, as in Courdestan, when their wheat-bread is exhausted before the return of harvest. They do not cultivate in this country either oats or rye; except where the Armenians are settled, who make great use of the latter in Lent. Rice is the universal aliment of all sorts of people in Persia; for this reason they are extremely careful in its cultivation; for, after they have sown it in the same manner as other grain, they in three months time transplant it, root by root, into fields, which are well watered, otherwise it would never attain that perfection in which we find it there; since it is softer, sooner boiled, and more delicious, than the same grain in any other part of the world. Perhaps its taste is, in some measure, heightened by a practice they make use of to give it a glossy whiteness, viz. by cleansing it, after it is beaten out of the husks, with a mixture of flour and salt. Corn ripens exceedingly in this country; so that in some parts they have a threefold crop in the year. The Persian bread is generally very thin, white, and good; and commonly cheap enough.

Perfia.

Metals of all sorts have been found in Persia. Since the reign of Shah Abbas the Great, iron, copper, and lead, have been very common; but there are no gold or silver mines open at present; though, as Persia is a very mountainous country, such might very probably be found, if pains were taken to search them out. There are silver mines in Kirman and Mazanderan, and one not far from Spauhawn; but they cannot be worked for want of wood. Minerals are also found in Persia in abundance; especially sulphur, saltpetre, salt, and alum. Nothing is more common in this country than to meet with plains, sometimes 10 leagues in length, covered entirely with salt, and others with sulphur or alum. In some places salt is dug out of mines, and even used in building houses. Marble, free-stone, and slate, are found in great plenty about Hamadan. The marble is of four colours, viz. white, black, red and black, and white and black. Persia yields two sorts of petroleum, or napthe; namely, black and white. In the neighbourhood of Tauris they find azure; but it is not so good as that brought from Tartary. Among the most valuable productions of Persia, are the precious stones called *turquoises*, of which there are several rocks or mines.

The horses of Persia are the most beautiful of the East, though they are not so much esteemed as those of Arabia; so great, however, is the demand for them, that the finest ones will fetch from 90l. to 450l. sterling. They are higher than the English saddle-horses; straight before, with a small head, legs wonderfully slender, and finely proportioned; they are mighty gentle, good travellers, very light and sprightly, and do good service till they are 18 or 20 years old. The great numbers of them sold into Turkey and the Indies, though none can be carried out of the kingdom without special licence from the king, is what makes them so dear. Next to horses, we may reckon mules, which are much esteemed here, and are very fine; and next to these we may justly place asses, of which they have in this country two sorts; the first bred in Persia, heavy and doltish, as asses in other countries are; the other originally of an Arabian breed, the most docile and useful

Persia.

useful creature of its kind in the world. They are used wholly for the saddle; being remarkable for their easy manner of going, and are very sure-footed, carrying their heads lofty, and moving gracefully. Some of them are valued at 20*l.* sterling. The mules here are also very fine; they pace well, never fall, and are seldom tired. The highest price of a mule is about 45*l.* sterling. Camels are also numerous in Persia, and very serviceable: they call them *kechty-krouch-konion*, i. e. the "ships of the land;" because the inland trade is carried on by them, as the foreign is by ships. Of these camels there are two sorts, the northern and southern: the latter, which is much the smaller, but swifter, will carry a load of about 700 weight, and trot as fast as a horse will gallop; the other will travel with a load of 1200 or 1300 weight: both are profitable to their masters, as costing little or nothing to keep. They travel without halter or reins; grazing on the road from time to time, notwithstanding their load. They are managed entirely by the voice; those who direct them making use of a kind of song, and the camel moving brisker, or at its ordinary pace, as they keep a quicker or slower time. The camels shed their hair so clean in the spring, that they look like scaled swine; but then they are pitched over, to keep the flies from stinging them. The camels hair is the most profitable fleece of all the tame beasts: fine fluffs are made of it, and in Europe, hats, with a mixture of a little beaver.

As beef is little eaten in Persia, their oxen are generally employed in ploughing, and other sorts of labour. Hogs are nowhere bred in Persia, if we except a province or two on the borders of the Caspian Sea. Sheep and deer are very common throughout all Persia.

Of wild beasts, the number is not great in that country, because there are few forests; but where there are any, as in Hyrcania, now called *Tabrisfan*, abundance of lions, bears, tigers, leopards, porcupines, wild boars, and wolves, are to be found; but the last are not so numerous as any of the other species.

There are but few insects in this country; which may be ascribed to the driness of the climate. In some provinces, however, there is an infinite number of locusts or grasshoppers, which fly about in such clouds as to darken the air. In certain parts of the Persian dominions they have large black scorpions, so venomous, that such as are stung by them die in a few hours. In others, they have lizards, frightfully ugly, which are an ell long, and as thick as a large toad, their skins being as hard and tough as that of the sea-dog: they are laid to attack and kill men sometimes; but that may be doubted. The southern provinces are infested with gnats; some with long legs, like those we call *midge*; and some white, and as small as fleas, which make no buzzing, but sting suddenly, and so smartly, that the sting is like the prick of a needle. Among the reptiles is a long square worm, called by the inhabitants *hazar-pey*, i. e. "thousand-feet," because its whole body is covered with feet: it runs prodigiously fast, and its bite is dangerous, and even mortal, if it gets into the ear.

There are in Persia all the several sorts of fowls which we have in Europe, but not in such great plenty; excepting, however, wild and tame pigeons, of which vast numbers are kept all over the kingdom, chiefly on

account of their dung; which is the best manure for melons. It is a great diversion among the lower sort of people in town and country to catch pigeons, tho' it be forbidden: for this purpose they have pigeons to taught, that flying in one flock, they surround such wild ones as they find in the field, and bring them back with them to their masters. The partridges of this country are the largest and finest in the world, being generally of the size of our fowls. Geese, ducks, cranes, herons, and many other sorts of water-fowl, are common here; as are likewise nightingales, which are heard all the year, but chiefly in the spring; martlets, which learn whatever words are taught them; and a bird called *noura*, which chatters incessantly, and repeats whatever it hears. Of birds of a larger size, the most remarkable is the pelican, by the Persians called *tacab*, i. e. "water-carrier;" and also *mifc*, i. e. "sheep;" because it is as large as one of those animals*. There are in Persia various birds of prey. Some of their fowls are the largest and finest in the world: the people take great pains to teach them to fly at game; the Persian lords being great lovers of falconry, and the king having generally 800 of these sort of birds, each of which has a person to attend it.

There is perhaps no country in the world which, generally speaking, is more mountainous than Persia; but many of them yield neither springs nor metals, and but few of them are shaded with trees. It is true, some of the chief of them are situated on the frontiers, and serve as a kind of natural ramparts, or bulwarks, to this vast empire. Among the latter are the mountains of Caucasus and Ararat, sometimes called the *mountains of Daghestan*; which fill all the space between the Euxine and Caspian Seas: those called *Taurus*, and the several branches thereof, run through Persia from Naxos to India, and fill all the middle of the country.

As to rivers, except the Araxes, which rises in the mountains of Armenia, and falls into the Kur or Cyrus before it reaches the Caspian Sea, there is not one navigable stream in this country. The Oxus divides Persia on the north-east, from Ubeck Tartary. The Indus also may now be reckoned among the rivers of Persia, as the provinces lying to the west of that river are now in possession of that crown: this river is said to run a course of more than 1000 miles, and overflows all the low grounds in April, May, and June.

The seas on the south of Persia are, the Gulph of Persia or Baffora, the Gulph of Ormus, and the Indian Ocean. The only sea on the north is the Caspian, or Hyrcanian sea; which is more properly a lake, having no communication with any other sea. These seas, together with the lakes and rivers, supply Persia with plenty of fish. The Caspian sea contains very fine fish on one side; and the Persian Gulph on the other, is believed to have more fish than any other sea in the world. On the coasts of this gulph is taken a sort of fish, for which they have no particular name: its flesh is of a red colour, very delicious, and some of them weigh 200 or 300 pounds. The river-fish are chiefly barbel; but far from being good. Those of the lakes are carps and shads. In the river at Spaulhawn are a great number of crabs, which crawl up the trees, and live night and day under the leaves, whence they are taken; and are esteemed very delicious food.

Persia.

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Mountains, rivers, and seas.

Perfia.
58
Trade.

The English, and other nations, trade with the Persians several ways, particularly by the Gulph of Ormus at Gombroon, and by the way of Turkey. A trade also was not many years since opened by the English with Persia through Russia and the Caspian Sea; but that is now discontinued, having been prohibited by the court of Russia, who were apprehensive that the English would teach the Persians to build ships, and dispute the navigation of the Caspian Sea with them. The principal commodities and manufactures of Persia are, raw and wrought silks, mohair, camblets, carpets, leather; for which, and some others, the European merchants exchange chiefly woollen manufactures; but the trade is carried on altogether in European shipping, the Persians having scarce any ships of their own, and the Russians the sole navigation of the Caspian Sea. There is not a richer or more profitable trade in the world, than that which is carried on between Gombroon and Surat in the East Indies; and the English East India company frequently let out their ships to transport the merchandize of the Banians and Armenians from Persia to India. The civil wars which desolated this country, and put a stop to all trade, after the death of Shah Nadir, seem to have been over several years, Kerim Khan, one of the competitors, having gained such a superiority in the year 1763 over his rivals, that he was crowned king; since which time peace and tranquillity seem to have taken place of anarchy and confusion. The Shah, or sovereign of Persia, is the chief merchant; and he usually employs his Armenian subjects to traffic for him in every part of the world. The king's agents must have the refusal of all merchandize, before his subjects are permitted to trade. It is computed that Persia produces yearly upwards of 22,000 bales of silk, chiefly in the provinces of Ghilan and Mazanderan, each bale weighing 263 pounds. Vast quantities of Persian silk used to be imported into Europe, especially by the Dutch, English, and Russians, before the civil wars began. The goods exported from Persia to India are, tobacco, all sorts of fruits, pickled and preserved, especially dates, marmalade, wines, distilled waters, horses, Persian feathers, and Turkey leather of all sorts and colours, a great quantity whereof is also exported to Muscovy and other European countries. The exports to Turkey are, tobacco, galls, thread, goats hair, Russia, mats, box-work, and many other things. As there are no ports in the east, and trading by commission, with the use of bills of exchange, is little known, traffic must proceed in a very awkward heavy manner, in comparison of that of Europe.

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Money.

The most current money of Persia are the abasseees, worth about 1 s. 4d. Sterling, they are of the finest silver. An abassee is worth two mahmoudes; a mahmoude, two shahees; and a shahee, ten single or five double casbeghes: these last pieces are of brass, the others of silver; for gold is not current in trade. The shahees are not very common; but mahmoudes and casbeghes are current every where. Horses, camels, houses, &c. are generally sold by the toman, which is an imaginary coin, worth 200 shahees, or 50 abasseees; and they usually reckon their estates that way. Such a one, they say, is worth 50 many tomans, as we say pounds in England.

Persia is an absolute monarchy, the lives and estates

of the people being entirely at the disposal of their prince. The king has no council established, but is advised by such ministers as are most in favour; and the resolutions taken among the women of the harem frequently defeat the best laid designs. The crown is hereditary, excluding only the females. The sons of a daughter are allowed to inherit. The laws of Persia exclude the blind from the throne; which is the reason that the reigning prince usually orders the eyes of all the males of the royal family, of whom he has any jealousy, to be put out. The king has generally a great many wives, which it would be death for any one, besides the eunuchs, who have the superintendence of them, to look at, or even see by accident; wherefore, when he travels, notice is given to all men to quit the road, nay their very houses, and to retire to a great distance.

The prime minister is called *attemaet doulet*, which signifies the director of the empire, and also *vizir azeem*, or the great supporter of the empire; as he alone almost sustains the whole weight of the administration. This minister's chief study is to please his master, to secure to himself an ascendancy over his mind, and to avoid whatever may give him any uneasiness or umbrage. With this view, he never fails to flatter him, to extol him above all the princes upon earth, and to throw a thick veil over every thing that might help to open his eyes, or discover to him the weakness of the state. He even takes particular care to keep the king in utter ignorance, to hide from him, or at least to soften, all unwelcome news; and, above all, to exalt immoderately every the least advantage he obtains over his enemies. As he takes these methods, which indeed are and must be taken, more or less, by the ministers of every despotic prince, to secure the favour and confidence of his master; so the inferior officers and governors of provinces are obliged to employ all the means in their power to secure the prime ministers, they depending no less upon him than he does upon the king. There is a gradation of despotism and slavery, down from the prime minister to the lowest retainer to the court, or dependent on the government. Children are sometimes, in Persia, required by the king to cut off the ears and nose, and even to cut the throats, of their parents; and these orders cannot be objected to, without endangering their own lives. Indeed, their baseness and mercenariness are such, that they will perpetrate such atrocious deeds without the least scruple or difficulty, when they have a promise or expectation of possessing their posts. The prime ministers, notwithstanding the precarious footing on which they stand, in effect of their abilities or good fortune, sometimes continue in their employments during life, or, if removed, are only banished to some city, where they are allowed to spend the remainder of their days in a private station.

Next to the prime minister are the na-dir, or grand-master of the household; the mehter, or groom of the chambers, who is always a white eunuch; the mir-akbor-bashe, or master of the horse; the mir-shikar-bashe, or great huntsman and falconer; the divan-beggi, or chief justice, to whom there lies an appeal from the deroga, or the lieutenant of police, in every town; the vaca-nuviez, or recorder of events, or first secretary of state; the mussau-the-elmenaleck, or mar-

Perfia.

Persia.]

ster of the accounts and finances of the kingdom; the numes-humbashes, or the king's chief physicians; the shickada-fibashes, or inspector of the palace, and regulator of rank at court; and the khans, or governors of provinces, under whom are other governors, called *jeltans*, appointed also by the king.

The chief ministers, in spirituals, are the zedder, or grand-pontiff, answering to the mufti among the Turks; under him are the sheik-el, selom, and cadi, who decide in all matters of religion, and make all contracts, testaments, and other public deeds, being appointed by the king in all the principal towns; and next to these are the pichnamas, or directors of the prayers; and the moulahs, or doctors of the law.

There is no nobility in Persia, or any respect shewn to a man on account of his family, except to those who are of the blood of their great prophet or patriarchs; but every man is esteemed according to the post he possesses; and when he is dismissed he loses his honour, and he is no longer distinguished from the vulgar.

With respect to the forces of Persia, their two bodies, called the *Kortshies* and *Goulans*, that serve on horseback, are well kept and paid, and may amount, the former to about 22,000, and the latter to about 18,000. The *kortshies* are descended from an ancient but foreign race; and the *goulans* are either Georgian renegades or slaves, or the children of slaves of all nations. The infantry, called *Tangtshies*, are picked out from among the most robust and vigorous of the peasants, and compose a body of 40,000 or 50,000. The Persians have few fortified towns, and had no ships of war till Kouli Khan built a royal navy, and among them had a man of war of 80 guns; but since the death of that usurper, we hear no more of their fleet.

The arms of the king of Persia are a lion couchant, looking at the sun as he rises over his back. His usual title is *Shah* or *Patschaw*, the "disposer of kingdoms." They add also to the king's titles those of *sultan*, and *chan* or *cham*, which is the title of the Tartar sovereigns. To acts of state the Persian monarch does not subscribe his name; but the grant runs in this manner, *viz. This act, or edict, is given by him whom the universe obeys.*

As to the manners of the ancient Persians, we know little of them; excepting that they were exceedingly voluptuous and effeminate. After the conquest of the empire by Alexander, the Greek discipline and martial spirit being in part communicated to them, they became much more formidable; and hence the Parthians were found to be a match, not only for the Syro-Macedonian princes, but even for the Romans. Of their manners we know little or nothing, but that to their valour and military skill they joined in a surprising degree all the luxury and dissipation of the ancient Persians.

The modern Persians, like the Turks, plundering all the adjacent nations for beauties to breed by, are men of a good stature, shape, and complexion; but the Gaures, or ancient Persians, are homely, ill-shaped, and clumsy, with a rough skin, and olive complexions. In some provinces, not only the complexions but the constitutions of the inhabitants, suffer greatly by the extreme heat and unwholesomeness of the air. The

Persian women, too, are generally handsome and well-shaped, but much inferior to those of Georgia and Circassia. The men wear large turbans on their heads, some of them very rich, interwoven with gold and silver; a vest, girt with a sash; and over it a loose garment, something shorter; with sandals, or slippers, on their feet. When they ride, which they do every day, if it be but to a house in the same town, they wear pliant boots of yellow leather; the furniture of their houses is extremely rich, and the stirrups generally of silver: whether on horseback or on foot, they wear a broad sword and a dagger in their sash. The dresses of the women does not differ much from that of the men; only their vests are longer, and they wear stiffened caps on their heads, and their hair down.

Their usual drink is water and sherbet, as in other Mahometan countries, wine being prohibited; but the officers and soldiers frequently break through these restraints, and drink wine, which is made by the Armenians and Gaures in Schiras and other Persian provinces; and none of them make any scruple of intoxicating themselves with opium, of which any of them will eat as much as would poison half a dozen Christians.

The Persians excel more in poetry than any other sort of literature; and astrologers are now in as great reputation in Persia as the magi were formerly. Their books are all manuscripts, the art of printing having not yet been introduced among them: they excel indeed in writing, and have eight different hands. They write from the right hand to the left, as the Arabs do. In their short-hand, they use the letters of the alphabet; and the same letters, differently pointed, will have 20 different significations. In short, the Persians are born with as good natural parts as any people in the East, but make a bad use of them; being great dissemblers, cheats, liars, and flatterers, and having a strong propensity to voluptuousness, luxury, idleness, and indolence; vices, indeed, to which the Asiatics in general are much addicted.

PERSIAN WHEEL. See HYDROSTATICS.

PERSICA, the PEACH, is by Linnæus referred to the same class and genus with amygdalus; however, as they are so commonly reckoned to be different genera, we have thought proper to distinguish them. There are a great variety of peach-trees planted in the gardens, some of which are preserved only for the beauty of their flowers, but most of them for the sake of the fruit. Of those remarkable for the beauty of their flowers the principal are, 1. The vulgaris, or common peach-tree, with double flowers, which is a very great ornament in gardens, producing very large double flowers of a beautiful red or purple colour, and grows to a considerable size. 2. The humilis, or dwarf-almond. 3. The africana, or double-flowering dwarf-almond. These two reach not above the height of three or four feet, though their flowers are of equal beauty with the former.

Of the peach-trees cultivated for the sake of their fruit there are a great number, to describe which particularly would exceed the proper bounds of this article. They are raised from the stones of the fruit, which should be planted in autumn on a bed of light dry earth, about three inches deep and four inches asunder. In the winter the beds should be covered with

Persia
||
Persica.

P E R S P E C T I V E.

with mulch to protect them from the frost. In this bed they should remain for a year; when they are to be taken up and planted in a nursery, where they are to remain one or two years; after which they must be removed to the places where they are to continue.

PERSICANA, in botany. See *PERYGONUM*.

PERSIUS (Flaccus Aulus), a Latin poet in the reign of Nero, celebrated for his satires. He was born, according to some, at Volterra in Tuscany; and according to others, at Tigulia, in the gulf Della Specia, in the year 34. He was educated till 12 years old at Valerius; and afterwards continued his studies at Rome under Palæmon the grammarian, Virgilius the rhetorician, and Cornutus the Stoic philosopher, who contracted a friendship for him. Persius consulted that illustrious friend in the composition of his verses. Lucian also studied with him under Cornutus; and appeared so charmed with his verses, that he was incessantly breaking out into acclamations at the beautiful passages in his satires: an example rarely seen in poets of equal rank. He was a steady friend, a good son, an affectionate brother and parent. He was chaste, meek, and modest: which shews how wrong it is to judge of a man's morals by his writings; for the satires of Persius are not only licentious, but sharp and full of bitterness. He wrote but seldom; and it was some time before he applied himself regularly to it.

Persius was of a weak constitution, and troubled with a bad stomach; of which he died in the 30th year of his age. Six of his satires remain; in their judgments of which the critics have been much divided, excepting as to their obscurity, Persius being indeed the most obscure of all the Latin poets. As a poet, he is certainly inferior to Horace and Juvenal; and all the labours of Isaac Casaubon, who has written a most learned and elaborate commentary upon him, cannot make him equal to either of them as a satirist, though in virtue and learning he exceeded them both. He was a professed imitator of Horace; yet had little of Horace's wit, ease, and talent at ridicule. His style is grand, figurative, poetical, and suitable to the dignity of the Stoic philosophy: and hence he shines most in recommending virtue and integrity: here it is that satire becomes him. He was too grave to court the muses with success: but he had a great soul, susceptible of noble sentiments, which give a grace but to indifferent poetry. His contemporaries thought highly of him. Quintilian allows, that Persius, although he wrote but one book of satires, acquired a great deal of true glory, *Multum et*

vere gloria quævis uno libro Persius meruit; and Martial says much the same thing, *Sæpius in libro memoratur Persius uno, &c.*

PERSON, an individual substance of a rational intelligent nature. Thus we say, an ambassador represents the person of his prince; and that, in law, the father and son are reputed the same person.

PERSON, in grammar, a term applied to such nouns or pronouns as, being either prefixed or understood, are the nominatives in all inflections of a verb; or it is the agent or patient in all finite or personal verbs. See *GRAMMAR*.

PERSONAL, any thing that concerns, or is restrained to, the person: thus it is a maxim in ethics, that all faults are personal.

PERSONAL *Action*, in law, is an action levied directly and solely against the person; in opposition to a real or mixed action. See *ACTION*.

PERSONAL *Goods*, or *Chattels*, in law, signifies any moveable thing belonging to a person, whether alive or dead. See *CHATELS*.

PERSONAL *Verb*, in grammar, a verb conjugated in all the three persons: thus called in opposition to an impersonal verb, or that which has the third person only.

PERSONALITY, in the schools, that which constitutes an individual a distinct person.

PERSONATE, the name of the 40th order in Linnæus's Fragments of a Natural Method, consisting of a number of plants whose flowers are furnished with an irregular gaping or grinning petal, which, in figure, somewhat resembles the snout of an animal. The bulk of the genera of this natural order arrange themselves under the class and order didynamia angiospermia of the Sexual Method.

The rest, although they cannot enter into the artificial class just mentioned, for want of the classic character, the inequality of the flamina; yet, in a natural method, which admits of greater latitude, may be arranged with those plants, which they resemble in their habit and general appearance, and particularly in the circumstance expressed in that title.

PERSONIFYING, or PERSONALIZING, the giving an inanimate being the figure, sentiments, and language of a person.

Personifying is essential to poetry, especially to the epopœia: the poets have therefore personified all the passions, and even represented them as deities; as, the goddess Persuasion, the god Sleep; the Furies, Envy, Discord; and Fame, Fortune, Victory, Sin, Death, &c.

P E R S P E C T I V E.

PERSPECTIVE teaches how to represent objects on a plane superficies, such as they would appear at a certain distance and height, upon a transparent plane perpendicular to the horizon, placed between the objects and the eye.

It was in the 16th century that *Perspective* was revived, or rather re-invented. It owes its birth to painting, and particularly to that branch of it which was employed in the decorations of the theatre, where landscapes were properly introduced, and which would

have looked unnatural and horrid if the size of the objects had not been pretty nearly proportioned to their distance from the eye. We learn from Vitruvius, that Agatharchus, instructed by Æschylus, was the first who wrote upon this subject; and that afterwards the principles of this art were more distinctly taught by Democritus and Anaxagoras, the disciples of Agatharchus. Of the theory of this art, as described by them, we know nothing; since none of their writings have escaped the general wreck that

Person
Personify
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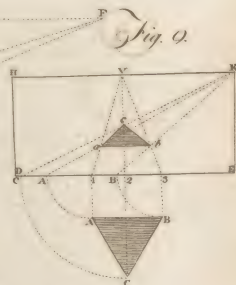
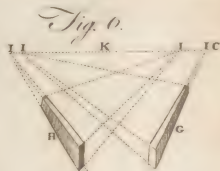
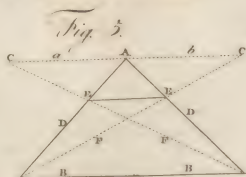
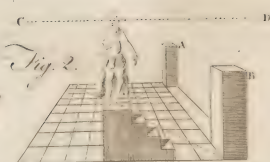
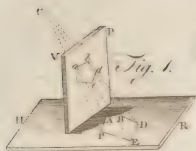
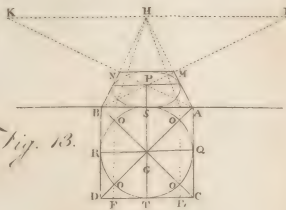
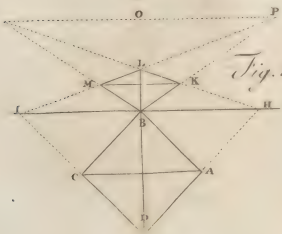
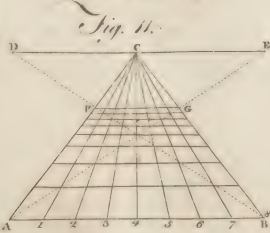
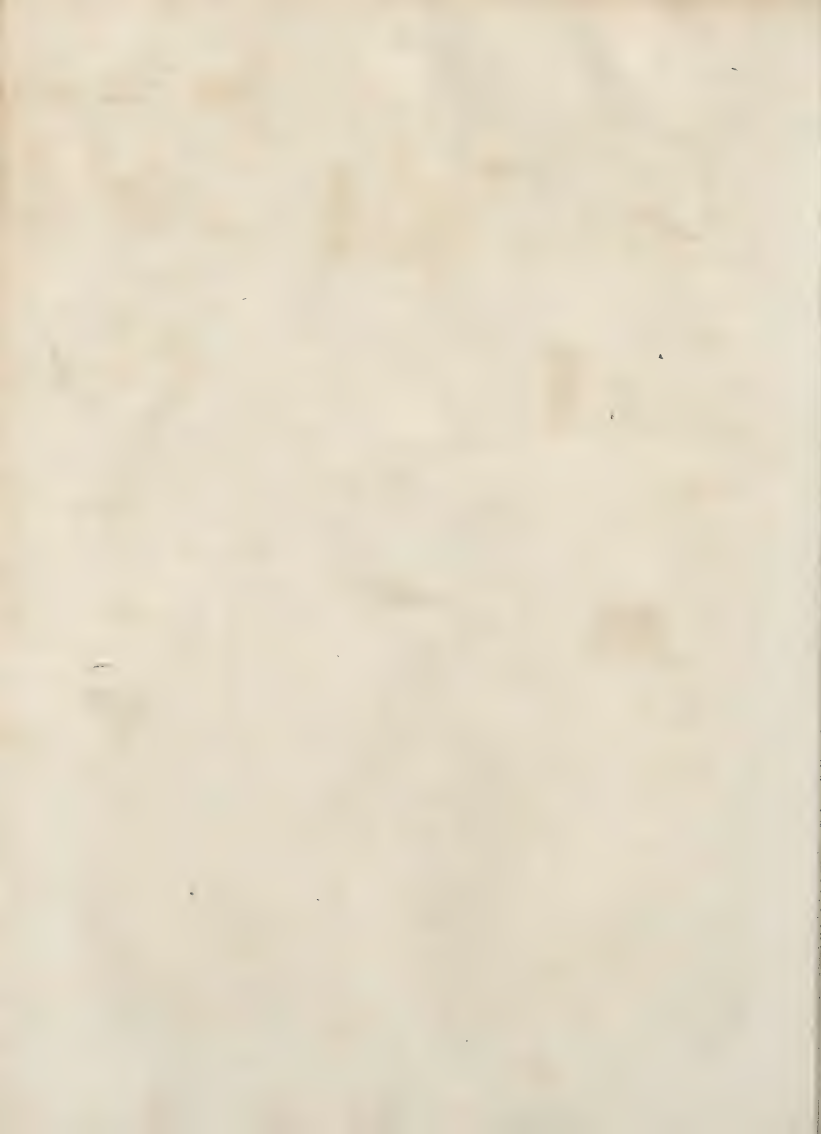


Fig. 10.





Perspective was made of ancient literature in the dark ages of Europe. However, the revival of painting in Italy was accompanied with a revival of this art.

The first person who attempted to lay down the rules of perspective was Pietro del Borgo, an Italian. He supposed objects to be placed beyond a transparent tablet, and endeavoured to trace the images which rays of light, emitted from them, would make upon it. But we do not know what success he had in this attempt, because the book which he wrote upon this subject is not now extant. It is, however, very much commended by the famous Egnazio Dante; and, upon the principles of Borgo, Albert Durer constructed a machine, by which he could trace the perspective appearance of objects.

Balthazar Peruzzi studied the writings of Borgo, and endeavoured to make them more intelligible. To him we owe the discovery of points of distance, to which all lines that make an angle of 45 degrees with the ground-line are drawn. A little time after, Guido Ubaldo, another Italian, found that all the lines that are parallel to one another, if they be inclined to the ground-line, converge to some point in the horizontal line; and that through this point also, a line drawn from the eye, parallel to them, will pass. These principles put together enabled him to make out a pretty complete theory of perspective.

Great improvements were made in the rules of perspective by subsequent geometers; particularly by professor Gravende, and still more by Dr Brook Taylor, whose principles are, in a great measure new, and far more general than any before him.

Plate CCXXXV In order to understand this subject, a general knowledge of the principles of Optics is absolutely necessary. The foundation of perspective may be understood, by supposing the pentagon ABDEF (fig. 1.) were to be represented by the rules of perspective on the transparent plane VP, placed perpendicularly on the horizontal plane HR; dotted lines are imagined to pass from the eye C to each point of the pentagon, as CA, CB, CD, &c. which are supposed, in their passage through the plane, PV to leave their traces or vestigia in the points *a, b, d*, &c. on the plane, and thereby to delineate the pentagon *abdef*; which, as it strikes the eye by the same rays that the original pentagon ABDEF does, will be a true perspective representation of it.

The business of perspective, therefore, is to lay down geometrical rules for finding the points *a, b, d, e, f*, upon the plane; and hence also we have a mechanical method of delineating any object very accurately.

Perspective is either employed in representing the ichnographies or ground-plots of objects: or the scenographies, or representations of the objects themselves.

But before we give any examples of either, it will be proper to explain some technical terms in regard to perspective in general: and first, the horizontal line is that which is supposed to be drawn parallel to the horizon through the eye of the spectator; or rather it is a line which separates the heaven from the earth, and which limits the sight. Thus, *A, B*, (*ibid.* fig. 2.) are two pillars below the horizontal line CD, by reason the line is elevated above them; in fig. 3. they are said to be equal with it, and in fig. 4. raised above it. Thus,

according to the different points in view, the objects will be either higher or lower than the horizontal line. The point of sight *A* (*ibid.* fig. 5.) is that which makes the central ray on the horizontal line *ab*: or, it is the point where all the other visual rays, DD, unite. The points of distance *C, C*, are points set off in the horizontal line at equal distances on each side of the point of sight *A*; and in the same figure BB represents the base line, or fundamental line: EE is the abridgment of the square; of which DD, D, are the sides; F, F, the diagonal lines, which go to the points of distance *C, C*. Accidental points are those where the objects end: these may be cast negligently; because neither drawn to the point or sight, nor to those of distance, but meeting each other in the horizontal line. For example, two pieces of square timber *G* and *H* (*ibid.* fig. 6.) make the points *I, I, I*, on the horizontal line: but go not to the point of sight *K*, nor to the points of distance *C, C*; these accidental points serve likewise for casements, doors, windows, tables, chairs, &c. The point of direct view, or of the front, is when we have the object directly before us; in which case it shews only the fore-side; and, if below the horizon, a little of the top; but nothing of the sides, unless the object be polygonous.

Thus the plane ABCD, (*ibid.* fig. 7.) is all in front; and if it were raised we should not see any thing of the sides AB or CD, but only the front AD: the reason is, that the point of view E being directly opposite thereto, causes a diminution on each side; which, however, is only to be understood where an elevation is the object; for if it be a plan, it shews the whole, as ABCD.

The point of oblique view, is when we see an object aside of us, and as it were aslant, or with the corner of the eye: the eye, however, being all the while opposite to the point of sight; in which case, we see the object laterally, and it presents to us two sides or faces.

For instance, if the point of sight be in *F*, (*ibid.* fig. 8.) the object GHK will appear athwart, and shew two faces GK and GH; in which case it will be a side point.

We shall now give some examples, by which it will appear, that the whole practice of perspective is built upon the foundation already laid down. Thus, to find the perspective appearance of a triangle ABC (*ibid.* fig. 9.) between the eye and the triangle draw the line DE, which is called the *fundamental line*; from *z* draw *z V*, representing the perpendicular distance of the eye above the fundamental line, be it what it will; and through *V* draw, at right angles to *z V*, HK parallel to DE: then will the plane DHKE represent the transparent plane on which the perspective representation is to be made. Next, to find the perspective points of the angles of the triangle, let fall perpendiculars *A 1, C 2, B 3*. from the angles to the fundamental DE: set off these perpendiculars upon the fundamental opposite to the point of distance *K*, to *B, A, C*; from *1, 2, 3*, draw lines to the principal point *V*; and from the points *A, B, C*, on the fundamental line, draw the right lines AK, BK, CK, to the point of distance *K*; which is so called, because the spectator ought to be so far removed from

Perspective. from the figure or painting, as it is distant from the principal point V. The points *a, b, and c,* where the visual lines V 1, V 2, V 3, intersect the lines of distance AK, BK, CK, will be the angular points of the angle *a b c,* the true representation of ABC.

To draw a Square Pavement in Perspective.

Plate CXXXVI. *fig. 10.* SUPPOSE your piece of pavement to consist of 64 pieces of marble, each a foot square. Your first business is, to draw an ichnographical plan or ground-plot of it, which is thus performed. Having made an exact square of the size you intend your plan, divide the base and horizon into eight equal parts; and from every division in the base to its opposite point in the horizon, rule perpendicular lines: then divide the sides into the same number, ruling parallel lines across from point to point: so will your pavement be divided into 64 square feet; because the eight feet in length, multiplied by the same in breadth, give the number of square feet or pieces of marble contained in the whole; then rule diagonals from corner to corner; and thus will your ground-plot appear as in *fig. 10.*

Fig. 11. Now, to lay this in perspective, draw another square to your intended size, and divide the base line AB into eight equal parts, as before; then fix your point of sight C in the middle of the horizon DE, and from the same point rule lines to every division in the base AB; after which, rule diagonal lines from D to B, and from E to A, answerable to those in the ground-plot, and your square will be reduced to the triangle ABC; then from the point F, where the diagonal DB intersects the line AC, to the opposite intersection G, where the diagonal EA crosses the line CB, rule a parallel line, which is the abridgment of the square. Then, through the points where the diagonals cross the rest of the lines which go from the base to the point of sight, rule parallel lines, and your square pavement will be laid in perspective, as in *fig. 11.*

Fig. 12. To diminish a Square viewed by the Angle D, *fig. 12.*

HAVING described the plane ABCD, draw a line to touch or raise the angle B, and falling perpendicularly on BD.

This being continued as a base line, lay your ruler on the side of the square AD and DC, and where the ruler cuts the terrestrial line make the points H, I.

Then from H and B draw lines to the point of distance P, and from I draw a line to the other point of distance G; and in the intersection of those lines, make points, which will give you the square KLMB.

To do without the plan: set off the diameter each way from the middle point B, as to H and I. But in either case no line is to be drawn to the point of sight O.

To diminish a Circle. See *fig. 13.*

DRAW a square ABCD about it, and from the angles AD and CB draw diagonals, dividing the circle into eight parts, and through the points where they cut it OO, draw lines from the base line perpendicular to DEF.

Then draw two diagonals QR, SP, intersecting each other at right angles in the centre G.

Having thus disposed the plan, draw lines from all

the perpendiculars to the point of sight H; and where *Perspective* they are intersected by the diagonals AK and BI, make points; the two last of which, M, N, give the square, which is to be divided into four by diagonals, intersecting each other in the point P.

In the last place, from the extremes of this cross, draw curve lines through the said points, which will give the form of the circle in perspective.

Of the Measures upon the Case in Perspective.

By the base line alone any depth may be given, and in any place at pleasure, without the use of squares; which is a very expeditious way.

As, for example, suppose the base line BS (*fig. 1.*) Plate CXXXVII. the point of view A, and the points of distance DE; if now you would make a plan of a cube BC, draw two occult or dotted lines from the extremes BC to the point of sight: then, to give the breadth, take the same measure BC, and set it off on the terrestrial line CF, and from F draw a line to the point of distance D; and where this line intersects the first ray C in the point G, will be the diminution of the plan of the cube BHGC.

If you would have an object farther towards the middle, take the breadth and the distance of the base line, as IK; and to have the depth, set it as you would have it on the same base as LM, and its width both on LM. Then from L and M draw occult lines to the point of distance D, and from the points NO, where those lines intersect the ray K, draw parallels to the terrestrial line, and you will have the square QPON.

After the same manner you may set off the other side of the square which should be on the base, as BHGC is here transferred to V. The points M and T, which are only two feet from the point S, afford a very narrow figure in X, as being very near.

Of the Base Line, and a single Point of Distance.

SINCE the depths and widths may be had by the means of this base line, there is no need of any further trouble in making of squares; as shall be shewn in this example.

Suppose a row of trees or columns is to be made on each side; on the base line lay down the place, and the distance between them, with their breadth or diameters, as ABCDEFG: then laying a ruler from the *Fig. 2.* point of distance O to each of the points ABCDEFG, the intersections it makes on the visual ray AH will be the bounds of the objects desired.

To set them off on the other side upon the ray GH, set one foot of the compasses upon the point of the eye H, and with the other strike an arch; the point wherein this cuts the ray GH, will be the corresponding bound.

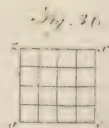
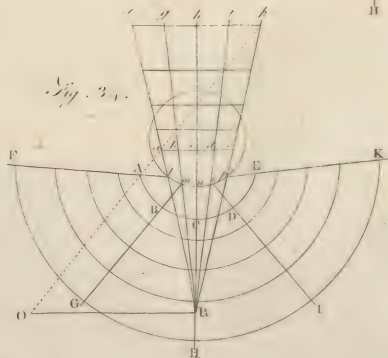
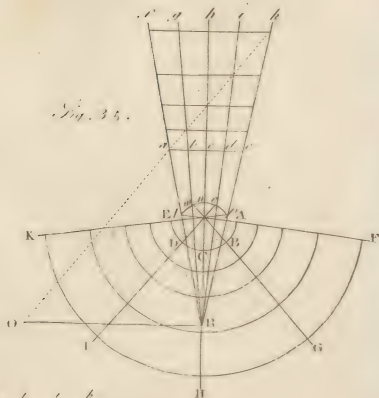
Thus M will be the same with N, and so of the rest; through which drawing parallels, you will have the breadths.

And as for the length, you may make it at pleasure: setting it off from A, as for instance to P, and then from P drawing a line to H; and where this cuts the other parallels, will be formed the plan required; which you may make either round or square.

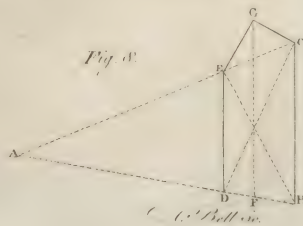
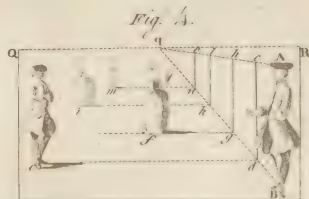
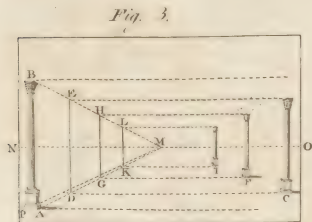
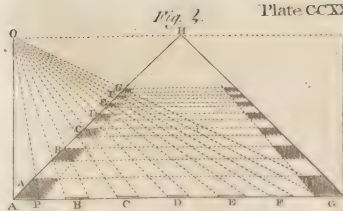
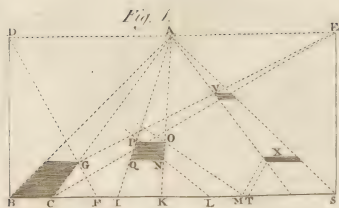


SHAN

Fig. 1.(B).
PHENICOPTERUS Haber
The Humming.



Well. body.



To find the Centre for the Roof of a Houfe, in an Oblique View.

Plate
C CXXXVII.
fig. 8.

SUPPOSE from the point of fight A, the vifual lines AB and AC be drawn, BC being one perpendicular given, and DE the other, rule the diagonals from D to C, and from E to E, and the perpendicular FG, raifed through the point of their interfection, will fhew the true centre of the roof, as will appear by ruling the lines GE and GC.

For want of being acquainted with this neceffary rule, many who have been well verfed in other parts of perspective, have fpoiled the look of their picture, by drawing the roofs of their houfes out of their true perpendicular.

We fhall conclude by giving a few practical rules.

1. Let every line, which in the object, or geometrical figure, is ftraight, perpendicular, or parallel to its bafe, be fo alfo in its fcenographic delineation.
2. Let the lines, which in the object return at right angles from the fore-right fide, be drawn fcenographically from the vifual point.
3. Let all ftraight lines, which in the object return from the fore-right fide, run in a fcenographic figure into the horizontal line.
4. Let the object you intend to delineate, ftanding on your right-hand, be placed alfo on the right-hand of the vifual point; and that on the left-hand, on the left-hand of the fame point; and that which is juft before, in the middle of it.
5. Let thofe lines which are (in the object) equidiftant to the returning line be drawn in the fcenographic figure, from that point found in the horizon.
6. In fetting off the altitude of columns, pedeftals, and the like, meafure the height from the bafe line upwards, in the front or fore-right fide; and a vifual ray down that point in the front fhall limit the altitude of the column or pillar, all the way behind the fore-right fide, or orthographic appearance, even to the vifual point. This rule you muft obferve in all figures, as well where there is a front or fore-right fide, as where there is none.
7. In delineating ovals, circles, arches, croffes, fpirals, and crofs-arches, or any other figure in the roof of any room, firft draw ichnographically, and fo with perpendiculars from the moft eminent points thereof, carry it up into the ceiling; from which feveral points, carry on the figure.
8. The centre in any fcenographic regular figure is found by drawing lines from oppofite angles; for the point where the diagonals crofs is the centre.
9. A ground plane of fquares is alike, both above and below the horizontal line; only the more it is diftant above or beneath the horizon, the fquares will be fo much the larger or wider.
10. In drawing a perspective figure, where many lines come together, you may, for the directing of your eye, draw the diagonals in red; the vifual lines in black; the perpendiculars in green, or other different colour, from that which you intend the figure fhall be of.
11. Having confidered the height, diftance, and pofition of the figure, and drawn it accordingly, with the fide or angle againft the bafe; raife perpendiculars from the feveral angles, or defigned points, from the figure of the bafe, and transfer the length of each perpendicular, from the place where it touches the bafe, to the bafe on the fide oppofite to the point of diftance; fo will the diametrals drawn to the perpendiculars in

the bafe, by interfection with the diagonals, drawn to the feveral transferred diftances, give the angles of the figures, and fo lines drawn from point to point will circumscribe the fcenographic figure.

12. If in a landfcape there be any ftanding waters, as rivers, ponds, and the like, place the horizontal line level with the fartheft fight or appearance of it.
13. If there be any houfe, or the like, in the picture, confider their pofition, that you may find from what point in the horizontal lines to draw the front and fides thereof.
14. In defcribing things at a great diftance, obferve the proportion, both in magnitude and diftance, in draught, which appears from the object to the eye.
15. In colouring and shadowing of every thing, you muft do the fame in your picture, which you obferve with your eye, efpecially in objects lying near; but, according as the diftance grows greater and greater, fo the colours muft be fainter and fainter, till at laft they lofe themfelves in a darkifh fky-colour.
16. The catoptrics are beft feen in a common looking-glass, or other polished matter; where, if the glass be exactly flat, the object is exactly like its original; but, if the glass be not flat, the refemblance alters from the original; and that more or lefs, according as the glass differs from an exact plane.
17. In drawing catoptric figures, the furface of the glass is to be confidered, upon which you mean to have the reflection; for which you muft make a particular ichnographical draught, or projection; which on the glass muft appear to be a plane full of fquares, on which projection transfer what fhall be drawn on a plane, divided into the fame number of like fquares; where though the draught may appear very confufed, yet the reflection of it on the glass will be very regular, proportional, and regularly compofed.
18. The dioptric, or broken beam, may be feen in a tube through a crystal or glass, which hath its furface cut into many others, whereby the rays of the object are broken. For to the flat of the crystal, or water, the rays run ftraight; but then they break and make an angle, which alfo by the refracted beams is made and continued on the other fide of the fame flat.
19. When thefe faces on a crystal are returned towards a plane placed directly before it, they feparate themfelves at a good diftance on the plane; becaufe they are all directed to various far diftant places of the fame.

See OPTICS.

Of the Anamorphosis, or Reformation of Distorted Images.

By this means pictures that are fo mifhapen, as to exhibit no regular appearance of any thing to the naked eye, fhall, when viewed by reflection, prefent a regular and beautiful image. The inventor of this ingenious device is not known. Simon Stevinus, who was the firft that wrote upon it, does not inform us from whom he learned it. The principles of it are laid down by S. Vauzelard in his *Perspective Conique et Cyllindrique*; and Gafpar Schott profeffes to copy Marius Bettinus in his defcription of this piece of artificial magic.

It will be fufficient for our purpofe to copy one of the fimpleft figures of this writer, as by this means the myftery of this art will be fufficiently unfolded. Upon the cylinder of paper, or paffeboard, ABCD, Plate
draw whatever is intended to be exhibited, as the let-
ters fig. 1.

ters IHS. Then with a needle make perforations along the whole out-line; and placing a candle, G, behind this cylinder, mark upon the ground-plane the shadow of them, which will be distorted more or less, according to the position of the candle or the plane, &c. This being done, let the picture be an exact copy of this distorted image, let a metallic speculum be substituted in the place of the cylinder, and let the eye of the spectator have the same position before the cylinder that the candle had behind it. Then looking upon the speculum, he will see the distorted image restored to its proper shape. The reformation of the image, he says, will not easily be made exact in this method, but it will be sufficiently so to answer the purpose.

Other methods, more exact and geometrical than this, were found out afterwards: so that these pictures could be drawn by certain rules, without the use of a candle. Schott quotes one of these methods from Bettinus, another from Herigonius, and another from Kircher, which may be seen in his *Magia*, vol. i. p. 162, &c. He also gives an account of the methods of reforming pictures by speculums of conical, and other figures.

Instead of copying any of these methods from Schott or Bettinus, we shall present our readers with that which Dr Smith hath given us in his *Optics*, vol. i. p. 250, as, no doubt, the best, and from which any person may easily make a drawing of this kind. The same description answers to two mirrors, one of which, fig. 34, is convex, and the other, fig. 35, is concave.

In order to paint upon a plane a deformed copy ABCDEKIHGF of an original picture, which shall appear regular, when seen from a given point O, elevated above the plane, by rays reflected from a polished cylinder, placed upon the circle *lnp*, equal to its given base; from the point R, which must be supposed to lie perpendicularly under O, the place of the eye, draw two lines *RaRe*; which shall either touch the base of the cylinder, or else cut off two small equal segments from the sides of it, according as the copy is intended to be more or less deformed. Then, taking the eye, raised above R, to the given height RO, somewhat greater than that of the cylinder, for a luminous point, describe the shadow *ackf* (of a square *axex*, fig. 36, or parallelogram standing upright up-

on its base *ae*, and containing the picture required) any where behind the arch *lnp*. Let the lines drawn from R to the extremities and divisions of the base *a, b, c, d, e*, cut the remotest part of the shadow in the points *f, g, h, i, k*, and the arch of the base in *l, m, n, o, p*; from which points draw the lines *lAF, mBG, nCH, oDI, pEK*, as if they were rays of light that came from a focus R, and were reflected from the base *lnp*; so that each couple, as *lA, lR*, produced, may cut off equal segments from the circle. Lastly, transfer the lines *laf, mbg*, &c. and all their parts, in the same order, upon the respective lines *lAF, mBG*, &c. and having drawn regular curves, by estimation, through the points *A, B, C, D, E*, through *F, G, H, I, K*, and through every intermediate order of points; the figure ACEKHF, so divided, will be the deformed copy of the square, drawn and divided upon the original picture, and will appear similar to it, when seen in the polished cylinder, placed upon the base *lnp*, by the eye in its given place O.

The practical methods of drawing these images seem to have been carried to the greatest perfection by J. Leopold, who, in the *Acta Lipsienfis*, for the year 1712, has described two machines, one for the images to be viewed with a cylindrical, and the other with a conical, mirror. The person possessed of this instrument has nothing to do but to take any print he pleases, and while he goes over the out-lines of it with one pen, another traces the anamorphosis.

By methods of this kind, groves of trees may be cut, so as to represent the appearance of men, horses, and other objects from some one point of view, which are not at all discernible in any other. This might easily be effected by one person placing himself in any particular situation, and giving directions to other persons what trees to lop, and in what manner. In the same method it has been contrived, that buildings, of circular and other forms, and also whole groupes of buildings, consisting of walls at different distances, and with different positions to one another, should be painted so as to exhibit the exact representation of particular objects, which could only be perceived in one situation. Bettinus has illustrated this method by drawings in his *Apiaria*.

P E R

P E R

PERSPIRATION *Glass*, or *Graphical Perspective*, in optics. See there, p. 5584.

Perth. PERSPIRATION, in medicine, the evacuation of the juices of the body through the pores of the skin. Perspiration is distinguished into sensible and insensible; and here sensible perspiration is the same with sweating, and insensible perspiration that which escapes the notice of the senses; and this last is the idea affixed to the word *perspiration* when used alone.

PERSPICUITY, properly signifies the property which any thing has of being easily seen through; hence is generally applied to such writings or discourses as are easily understood.

PERSPICUITY, in composition. See ORATORY, 2^o 42.

PERTH, a county of Scotland, including Menteith, Braidalbin, Athol, Strathene, part of Gowrie,

and Perth Proper; is bounded by Badenoch and Lochaber on the north and north-west; by Marr on the north-east; by Argyle and Lennox on the west and south-west; having Clackmannanshire, part of Stirlingshire, and the Forth to the south; the shires of Kinross and Fife to the south-east, and Angus to the east. It extends above 70 miles in length, and near 60 at its greatest breadth, exhibiting a variety of Highlands and Lowlands; mountains, hills, dales, and straths, diversified with pasture-grounds, corn-fields, and meadows; rivers, lakes, forests, woods, plantations, inclosures, towns, villages, and a great number of elegant seats, beautifully situated, belonging to noblemen and gentlemen. The chief rivers of Perthshire are the Tay, the Keith, and the Erne, besides a great number of subordinate streams. The Tay, which is the largest river in Scotland, derives its source from

Perth.

Perth. the mountains of Braidalbin, and spreads itself into a lake, called *Loch Tay*, 15 miles in length and six in breadth; then, after a winding course of 40 miles, during which it is swelled by many brooks and rivulets, it ends in the Frith of Tay, a broad navigable inlet, which opens to the sea, not far from the bay of St Andrews. The river Keith is famous for its salmon-fishery, and its steep cataract, near the Blair of Drummond, the noise of which is so loud as to deafen those who approach it. The river Erne raises from Loch-erne, a lake seven miles long, in the mountainous country of Stratherne: this river, after a course of 34 miles from east to west, during which it receives many streams and rivulets, falls into the Tay, at Abernethy.

Free-stone, lead, iron, and copper ores, with some lapis calaminaris, are found in different places of Perthshire. The soil, being generally rich and well manured, produces excellent wheat, and all kinds of grain. The hilly country abounds with pasture for the black cattle, horses, sheep, goats, and deer. The heaths, woods, and forests, are stored with variety of game; the rivers teem with salmon and trout; the gardens and orchards are stored with all kinds of herbs, roots, apples, pears, cherries, plums, and almost every species of fruit found in South Britain. The houses and attire, even of the commonalty, are neat and decent; and every peasant can produce a good quantity of linen, and great store of blankets, made in his own family. Indeed, this is the case through all the Lowlands of Scotland. Flax is reared by every husbandman; and being dressed at home, is spun by the females of his family into thread for linen; this is woven by country weavers, of whom there is a great number through all the Low Country, and afterwards bleached or whitened by the good-wife and her servants; so that the whole is made fit for use at a very small expence. They likewise wash, card, spin, and weave their wool into tartan for plaids, kerries, and coarse russet-cloth, for common wearing, besides great part of it which is knit into caps, stockings, and mitts. Plaids, made of the finest worsted, are worn either plain or variegated, as veils, by women of the lower, and even of the middle rank; nay, some years ago, ladies of fashion wore filken plaids with an undress: this is a loose piece of drapery, gathered about the head, shoulders, and waist, on which it is crossed, so as to leave the hands at liberty, and produces a very good effect to the eye of the spectator. The Lowlanders of Perthshire are civilized, hospitable, and industrious: the commerce of the country consists chiefly in corn, linen, and black cattle: there are, moreover, some merchants who trade to foreign countries.—For an account of the different divisions of this county above mentioned, see the articles as they occur in the order of the alphabet.

PERTH Proper, stretching 20 miles in length, and, at some places, 15 in breadth, is bounded on the north-east, by the Carse of Gowrie; on the east, by Angus; on the west, by Stratherne; on the north, by Athol; and on the south, by the Frith of Tay. This is likewise a fruitful country, populous, and well cultivated, abounding with gentlemen who possess opulent estates; with farmers who understand agriculture; and with manufacturers who turn their industry to great

account. North-eastward from Perth to Brechin, lies the vale of Strathmore, one of the most fertile districts in Scotland, which gives the title of *Earl* to the noble family of Lyon.

PERTH, the capital of the county of that name, is an agreeable, populous town, situated 20 miles within land, on the south bank of the river Tay. It was otherwise called *St Johnston's*, from a church dedicated to St John, as the patron of the place. It is a royal borough, second in dignity to the metropolis, the seat of a large presbytery, and gave the title of *Earl* to the family of Drummond, which is now forfeited. Perth, in the reign of Edward I. of England, was possessed by the English, who secured it with fortifications: but, after an obstinate resistance, they were expelled by Robert Bruce. In the year 1715, the rebels made it a place of arms, and retired to it, after the battle of Dumbaine; but they were in a little time dislodged by the duke of Argyle, and retreated northwards with the pretender. The town is populous and handsome; the streets are well paved, and tolerably clean at all times; and the houses, tho' not stately, make a very decent appearance. Here is a large church, an old palace that belonged to the earls of Gowrie, but now devolved to the crown; a stately town-house, several other public edifices, and houses belonging to gentlemen. A monastery of Carthusians was here established by king James I. of Scotland, who lost his life on the very spot, by the treachery of Athol and his accomplices. The town was anciently provided with a stone-bridge over the river, which an inundation swept away; but a new and very fine one has lately been built.

This town has but one parish, which has two churches, besides meetings for separatists, who are very numerous. One church, which belonged to a monastery, is very ancient: not a vestige of the last is now to be seen; for the disciples of Knox made a general desolation of every edifice that had given shelter to the worshippers of the church of Rome: it being one of his maxims, to pull down the nests, and then the rooks would fly away.

The flourishing state of Perth is owing to two accidents: the first, that of numbers of Cromwell's wounded officers and soldiers choosing to reside here, after he left the kingdom, who introduced a spirit of industry among the people: the other cause was the long continuance of the earl of Mar's army here in 1715, which occasioned vast sums of money being spent in the place. But this town, as well as all Scotland, dates its prosperity from the year 1745; the government of this part of Great Britain having never been settled till a little after that time.

The trade of Perth is considerable. It exports annually 150,000 l. worth of linen, from 24,000 to 30,000 bolls of wheat and barley to London and Edinburgh, and about the same in cured salmon. That fish is taken there in vast abundance; 3000 have been caught in one morning, weighing, one with another, 16 pounds; the whole capture, 48,000 pounds. The fishery begins at St Andrew's day, and ends August 26th, old style. The rents of the fisheries amount to 3000 l. per annum. Smelts come up this river in May and June.

There has been in these parts a very great fishery of

Pertinax
 Peru.

of pearl, got out of the fresh-water mufcles. From the year 1761 to 1764, 10,000*l.* worth were sent to London, and fold for 10*s.* to 1*l.* 16*s.* per ounce. Mr Pennant was told that a pearl has been taken there that weighed 33 grains. But this fishery is at prefent exhausted, from the avarice of the undertakers: it once extended as far as Loch-Tay.

PERTINAX, an illuftrious Roman, raifed himfelf by his valour and merit to the confular dignity; and upon the death of Commodus, was elected emperor by the pretorian band in 193. Though he owed his elevation to thefe foldiers, his firft care was to repress their infolence, and to oblige them to obferve ftrict difcipline; upon which they revolted, and in the tumult one of the private men affaffinated this renowned hero, who was the father of his people, after a reign of 87 days.

PERTINENT OF LANDS, in Scots law. See **LAW**, N^o cxlvii. 6.

PERU, a country of South America, bounded on the north by Popayan, on the weft by the South Sea, and on the eaft by the vaft ridge of mountains called the *Andes*; and extending 1500 miles in length from north to fouth, though only 125 in breadth from eaft to weft, between the *Andes* and the fea; though in other places it is much broader, and, according to fome, not lefs than 300 miles.

This country was difcovered by the Spaniards; and the firft intelligence they had of it was on the following occafion. Nunez de Balboa having been raifed to the government of the fmall colony at Santa Maria in Darien by the fuffrages of his companions, was very defirous of having that authority confirmed by the court of Spain. For this purpofe he endeavoured to recommend himfelf to the Spanifh miniftry by fome important fervice; that is, by extorting from the Indians as much gold and filver as he could. He therefore made frequent inroads into the adjacent country, fubdued feveral of the caciques or petty princes, and collected a confiderable quantity of gold. In one of thefe expeditions, the Spaniards contended fo violently about the divifion of fome gold which they had taken, that they were on the point of coming to blows with one another. A young cacique who was prefent, affonifhed at fuch contention about a thing of which he knew not the ufe, tumbled the gold out of the balance with indignation, and turning to the Spaniards, told them, that fince they valued gold fo very highly, he would conduct them to a country where the moft common utenfils were made of that metal. The Spaniards eagerly caught at this hint; and upon further queftioning the cacique, were informed, that at the diftance of fix days journey, towards the fouth, from the place where they were at that time, they fhould difcover another ocean, near which this defirable country was fituated; but if they intended to attack that powerful ftate, they muft afsemble a much greater number of forces than had hitherto appeared on the continent.

Balboa was transported at the news. He immediately concluded, that the ocean mentioned by the cacique was that which Columbus had fo long fought for in vain, and that the rich territory defcribed to him muft be part of the Eaft Indies. He was therefore impatient till he fhould arrive at that happy coun-

try, in comparifon with the difcovery of which all former exploits almoft vanifhed into nothing. In order therefore to procure a force fufficient to ensure fuccels in his enterprife, he firft fecured the friendfhip of the neighbouring caciques, and then difpatched fome of his officers to Hispaniola, with a large quantity of gold as a proof of his paft fuccels, and an earneft of what he expected. By this means he fecured the friendfhip of the governor, and procured a confiderable reinforcement. But though he now imagined himfelf fufficiently ftrong to attempt the difcovery, there were ftill prodigious difficulties to be furmounted. The ifthmus of Darien, though not above 60 miles in breadth, has a chain of lofty mountains running through its whole extent. Being fituated between two vaft oceans, the Atlantic and Pacific, the climate is exceffively moift, infomuch that it rains for two-thirds of the year. In confequence of this the valleys are marfhy, and fo frequently overflowed, that the inhabitants find it neceffary in fome places to build their houfes upon trees, in order to be elevated at fome diftance from the damp foil, and the odious reptiles engendered in the waters. There are alfo many large rivers very difficult to be croffed; and as the country at that time was only inhabited by a few wandering favages, the enterprife of Balboa is looked upon as the moft difficult that had been undertaken by any Spanifh adventurer.

On this arduous task Balboa fet out on the 1ft day of September 1513, about the time that the periodical rains begin to abate. He had only 190 Spaniards along with him; but all of them were hardy veterans, inured to the climate of America, and very much attached to their leader. A thoufand Indians attended in order to carry their provifions and other neceffaries; and they had along with them fome of thofe fierce dogs fo terrible to the natives of America.

Balboa proceeded by fea, and without difficulty, to the territories of a cacique whose friendfhip he had gained; but as foon as he began to advance into the interior parts of the country, he met with all the difficulties above mentioned. Some of the caciques alfo, at his approach, fled with all their people to the mountains, carrying off or deftroying whatever could afford fubfiftence to an army. Others collected their force in order to oppofe him: however Balboa continued unmoved in fpite of all difficulties; and at laft, after a moft painful journey of 25 days, he arrived at the South Sea; when, with the moft extravagant tranfports of joy, he went into it up to the middle, and took poffeffion of the ocean in his mafter's name, vowing to defend it againft all the enemies of Spain.

That part of the South Sea which Balboa now difcovered, he called the *Gulf of St Michael*; which name it ftill retains, and is fituated to the eaft of Panama. From fome of the neighbouring caciques he extorted provifions and gold by force; others fent him prefents voluntarily; and he had the fatisfaction to hear, that the adjacent coasts abounded with pearl-oysters. The inhabitants were alfo unanimous in declaring, that there was to the fouthward a very rich and populous country, where the people had tame animals, which they endeavoured to defcribe to him, meaning the Peruvian fheep. But however impatient he might be to vifit this empire, he confidered it as highly

Peru.

Difficulties they had to overcome.

Balboa firft gets a fight of the South Sea.

How difcovered by the Spaniards.

Peru.

Peru.

4 He is deprived of his command;

highly improper to venture thither with a handful of men exhausted by labour and disease. He therefore led back his followers to Santa Maria, in order to refresh them after their fatigues; and from thence he sent an account to the court of Spain of the important discovery he had made, demanding a reinforcement of 1000 men, in order to conquer the country he had newly discovered. But here his hopes were all blasted at once. The king indeed determined to prosecute the discovery, but refused to continue Balboa in his government, appointing Pedrarias Davila to supersede him, and giving him the command of 15 stout vessels, with 1200 soldiers, to ensure his success.

Balboa, though much mortified by his disgrace, submitted to the king's pleasure without repining. It was not long, however, before he met with an additional misfortune; the new governor tried him for some pretended irregularities committed before his arrival, and fined him of almost all he was worth. In the mean time the Spaniards, paying no regard to the treaties concluded by Balboa with the Indians, plundered and destroyed all indiscriminately, inasmuch that the whole country, from the gulph of Darien to the lake Nicaragua, was desolated. The new comers had also arrived at the most unlucky time of the year, namely, about the middle of the wet season, when the excessive rains produced the most violent and fatal diseases. To this was joined an extreme scarcity of provisions; so that in the space of a month above 600 Spaniards perished in the utmost misery.

Balboa failed not to send violent remonstrances to Spain against the conduct of the new governor; and he, on the other hand, accused his antagonit of having deceived the king by false accounts of the country, and magnifying his own exploits beyond measure. At last the king, sensible of his error in superseding Balboa, appointed him adelantado, or lieutenant-governor of the countries on the South Sea, with very extensive privileges and authority; enjoining Pedrarias to support him in all his enterprises, and to consult with him in every thing which he himself undertook. It was impossible, however, to extinguish the envy of Pedrarias; and therefore, though a reconciliation took place in appearance, even so far, that Pedrarias agreed to give his daughter in marriage to Balboa, yet he soon after had him condemned and executed on pretence of disloyalty, and an intention to revolt from the king.

5 And put to death.

On the death of Balboa, the thoughts of conquering Peru were for a time laid aside; however it still remained an object of desire to all the Spanish adventurers in America. Accordingly several armaments were fitted out with a design to explore and take possession of the countries to the east of Panama; but, either through the difficulties which attended the undertaking itself, or the bad conduct of the adventurers, all of them proved unsuccessful, until at last it became a general opinion, that Balboa's scheme had been entirely visionary.

6 A new expedition set on foot.

Still, however, there were three persons settled at Panama, on whom the common opinion made so little impression, that they determined to go in quest of this country, looked upon to be chimerical by the generality of their neighbours. Their names were *Francisco Pizarro*, *Diego de Almagro*, and *Hernando Luque*. Pi-

zarro and Almagro were soldiers of fortune, and Luque was an ecclesiastic, who acted both as priest and school-master at Panama. Their confederacy was authorised by Pedrarias governor of Panama; and each engaged to employ his whole fortune in the adventure. Pizarro, being the least wealthy of the three, engaged to take upon himself the greatest share of the fatigue and danger, and to command in person the armament which was to go first upon the discovery. Almagro offered to conduct the supplies of provisions and reinforcements of troops which might be necessary; and Luque was to remain at Panama, in order to negotiate with the governor, and to superintend whatever was carrying on for the general interest.

7 Meets with bad success at first.

In 1524, Pizarro set sail from Panama with a single vessel of small burthen, and 112 men; and so little was he or his countrymen at that time acquainted with the climate of America, that the most improper season of the whole year was chosen for his departure; the periodical winds, which were then set in, being directly opposite to the course which he proposed to steer. The consequence of this was, that after beating about for 70 days, with much danger and fatigue, he had advanced scarce as far to the south-east as a skilful navigator will now make in three days. He touched at several places of Terra Firma; but finding that country exceedingly inhospitable and unhealthy, he was obliged to retire to Chuchama, opposite to the Pearl Islands, where he hoped to receive some reinforcements from Panama. Here he was found by Almagro, who had set out in quest of him with a reinforcement of 70 men, and had suffered distresses very much resembling those of Pizarro himself. In particular, he had lost an eye in a combat with the Indians. However, he had advanced as far as the river of St Juan in the province of Popayan, where the country shewing a better aspect, and the inhabitants more friendly, our projectors again began to indulge themselves in hopes, and determined by no means to abandon their scheme.

Almagro returned to Panama, in hopes of recruiting their shattered troops. But the bad accounts of the service gave his countrymen such an unfavourable idea of it, that Almagro could levy no more than 80 men, and these with great difficulty. Slender as this reinforcement was, however, the adventurers did not hesitate at renewing their enterprise. The disasters and disappointments they met with in this new attempt, were scarce inferior to those they had already experienced, when part of the armament at last reached the bay of St Matthew on the coast of Quito, and landed at Tacamez, to the south of the River of Emeralds, where they met with a more fertile and champaign country than any they had yet seen; the natives also were more civilized, and clothed in garments of cotton or woolen stuff, adorned with trinkets of gold and silver. But notwithstanding these favourable appearances, Pizarro did not think fit to attack such a powerful empire with a handful of soldiers already exhausted; and therefore retired to a small island called *Gallo*, with part of the troops; from whence he dispatched Almagro to Panama, in hopes of obtaining a reinforcement.

The reception which Almagro met with was by no means agreeable. Some of the adventurers had informed their friends of the many dangers and losses which

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which they had sustained; which not only disheartened people from engaging in the service, but weighed so much with Pedro de los Rios, the successor of Pedrarias, that he prohibited the raising of new recruits, and even dispatched a vessel to bring home Pizarro and his companions from the island of Gallo. Almagro and Luque, though much mortified with this disappointment, privately advised Pizarro not to relinquish an enterprise on which they had built all their hopes. He therefore positively refused to obey the orders of the governor, and employed all his address in persuading his men not to abandon him. But the calamities to which they had been exposed had such an effect upon them, that when he drew a line upon the sand with his sword, telling such as wished to return that they might pass over it, only 13 had resolution to remain with him.

Pizarro with his little troop now fixed their residence on the island of Gorgona, which they considered as a safer retreat than Gallo, as being farther removed from the coast and uninhabited, so that they might with the greater security wait for supplies. Here, they continued five months in the most unwholesome climate imaginable, and at last had come to a resolution of committing themselves to sea on a float, when a vessel arrived from Panama to their relief. This was the effect of the continued solicitations of Almagro and Luque; who, though they could not prevail upon the governor to favour the undertaking, had succeeded so far as to induce him to send a small vessel to the relief of Pizarro and his unfortunate associates. However, the more effectually to shew his disapprobation of Pizarro's scheme, the governor refused to allow one land-man to go on board of the ship which he sent.—The hopes of the adventurers, however, were now again revived, and Pizarro easily induced them to resume their scheme. Instead of returning to Panama, therefore, they failed to the south-east, and in 20 days after the discovery of Gorgona they discovered the coast of Peru. Having touched at some places of less note, they at length arrived at Tumbez, remarkable for its stately temple, and a palace of the Incas, or sovereigns of the country. Here, they found that what had been told them concerning the riches of the country was true; not only ornaments and sacred vessels being made of gold and silver, but even such as were for common use. Yet to attempt the conquest of this opulent empire with their slender force, would have been madness; they contented themselves therefore with viewing it, procuring two of the beads of burthen called *Llamas*, to which they gave the name of sheep, some vessels of gold and silver, and two young men, whom they proposed to instruct in the Castilian language. With these Pizarro arrived at Panama in the year 1527, near three years after he had set out from that place in his expedition.

The empire of Peru thus discovered, is said to have been originally possessed by independent tribes, justly reckoned among the most savage even in America; living more like wild beasts than men. For several ages they lived in this manner, when suddenly there appeared on the banks of a lake called *Titicaca*, a man and woman of majestic form, and clothed in decent garments. They declared themselves to be the children of the sun, sent by their beneficent parent to instruct and reclaim

mankind.

The names of these two extraordinary personages were *Manco Capac* and *Mama Ocolla*. At their persuasion, several of the dispersed savages united, and, receiving their commands as heavenly injunctions, followed them to Cuzco, where they settled, and began to lay the foundations of a city. Manco Capac instructed the men in agriculture, and other useful arts; while Mama Ocolla taught the women to spin and weave; after which Manco turned his attention towards the introducing of proper laws, and regulations into his new state.

Thus, according to the Indian tradition, was founded the empire of the Incas, or lords of Peru. At first its extent was small, the territory of Manco Capac reaching not above eight leagues from Cuzco his capital. Within these narrow limits, however, he exercised the most perfect despotism, and the same was maintained by his successors, all of whom were not only obeyed as monarchs, but revered as deities. Their blood was held to be sacred, and, by prohibiting intermarriages with the people, was never contaminated by mixing with that of any other race. The family, thus separated from the rest of the nation, was distinguished by peculiarities in dress and ornaments, which it was unlawful for others to assume. Among the Peruvians, however, it is said, that this high degree of veneration was made use of by the monarchs only to promote the good of their subjects. If we may believe the accounts given by their countrymen, the Peruvian monarchs extended their empire not with a view to increase their own power and wealth, but from a desire of diffusing the blessings of civilization, and the knowledge of the arts which they possessed, among the barbarous people whom they reduced, and, during a succession of 12 monarchs, not one deviated from this character.

When the Spaniards first visited this country, they found it agitated by a civil war. Huana Capac, the 12th monarch from the founder of the state, was seated on the throne; who is represented as a prince no less conspicuous for his abilities in war, than for his pacific virtues. By him the kingdom of Quito was subdued, which almost doubled the extent of the dominions and power of the Peruvian empire. Notwithstanding the ancient and fundamental law against polluting the blood of the Inca with any foreign alliance, Huana married the daughter of the conquered monarch, by whom he had a son named *Atabalipa*, commonly written *Atabalipa*, to whom, at his death in 1529, he left the kingdom of Quito, bestowing the rest of his dominions upon Huascar his eldest son by a mother of the royal race. This produced a civil war, in which Atabalipa proved victorious, and afterwards attempted to secure himself on the throne by putting to death all the descendants of Mingo Capac, styled *the children of the Sun*, whom he could seize either by force or stratagem; however, from a political motive, he spared the life of his rival Huascar, who had the misfortune to be taken prisoner in an engagement, that, by issuing out orders in his name, he might more easily establish his own authority, and cover the illegality of his birth.

This contest had so much engaged the attention of the Peruvians, that they never once attempted to check

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8
Pizarro abandoned by all his men but 13.

9
Goes on with his scheme at all adventures.

10
History of the Incas of Peru.

11
Progress of the Spaniards facilitated by a civil war among the natives.

check the progress of the Spaniards. It was some time, however, before Pizarro was informed of this contest, so much in his favour. The first intelligence which he received of it was a message from Huascar, asking his assistance against Atabalipa, whom he represented as a rebel and an usurper. Pizarro perceived the importance of the intelligence, and therefore determined to push forward, while intestine discord put it out of the power of the Peruvians to attack him with their whole force. Being obliged to divide his troops, in order to leave a garrison in St Michael, which might serve for a place of retreat in case of a disaster, he began his march with only 62 horsemen and 102 foot-soldiers, 20 of whom were armed with cross-bows, and only three with muskets. He directed his course towards Caxamalca, a small town at the distance of 12 days march from St Michael, where Atabalipa was encamped with a considerable body of troops. Before he had proceeded far, an officer dispatched by the Inca met him with a valuable present from that prince, accompanied with a proof of his alliance, and his assurances of a friendly reception at Caxamalca. Pizarro, according to the usual artifice of his countrymen in America, pretended to come as the ambassador of a very powerful monarch, and declared that he was now advancing with intention to offer Atabalipa his aid against those enemies who disputed his title to the throne.

As the object of the Spaniards in entering their country was altogether incomprehensible to the Peruvians, they had formed various conjectures concerning it, without being able to decide whether they should consider their new guests as beings of a superior nature, who had visited them from some beneficent motive, or as formidable avengers of their crimes, and enemies to their repose and liberty. The continual professions of the Spaniards, that they came to enlighten them with the knowledge of truth, and lead them in the way of happiness, favoured the former opinion; the outrages which they committed, their rapaciousness and cruelty, were awful confirmations of the latter. While in this state of uncertainty, Pizarro's declaration of his pacific intentions so far removed all the Inca's fears, that he determined to give him a friendly reception. In consequence of this resolution, the Spaniards were allowed to march in tranquillity across the sandy desert between St Michael and Motupè, where the most feeble effort of an enemy, added to the unavoidable distresses which they suffered in passing through that comfortless region, must have proved fatal to them. From Motupè they advanced towards the mountains which encompass the low country of Peru, and passed through a defile so narrow and inaccessible, that a few men might have defended it against a numerous army. But here likewise, from the same inconsiderate credulity of the Inca, the Spaniards met with no opposition, and took quiet possession of a fort erected for the security of that important station. As they now approached near to Caxamalca, Atabalipa renewed his professions of friendship; and, as an evidence of his sincerity, sent them presents of greater value than the former.

On entering Caxamalca, Pizarro took possession of a large court, on one side of which was a house which the Spanish historians call a palace of the Inca, and on

the other a temple of the sun, the whole surrounded with a strong rampart or wall of earth. When he had posted his troops in this advantageous station, he dispatched Hernando Soto, and his brother Ferdinand, to the camp of Atabalipa, which was about a league distant from the town. He instructed them to confirm the declaration which he had formerly made of his pacific disposition, and to desire an interview with the Inca, that he might explain more fully the intention of the Spaniards in visiting his country. They were treated with all the respectful hospitality usual among the Peruvians in the reception of their most cordial friends, and Atabalipa promised to visit the Spanish commander next day in his quarters. The decent deportment of the Peruvian monarch, the order of his court, and the reverence with which his subjects approached his person and obeyed his commands, astonished those Spaniards, who had never met in America with any thing more dignified than the petty cacique of a barbarous tribe. But their eyes were still more powerfully attracted by the vast profusion of wealth which they observed in the Inca's camp. The rich ornaments worn by him and his attendants, the vessels of gold and silver in which the repast offered to them was served up, the multitude of utensils of every kind formed of those precious metals, opened prospects far exceeding any idea of opulence that a European of the 16th century could form.

On their return to Caxamalca, while their minds were yet warm with admiration and desire of the wealth which they had beheld, they gave such a description of it to their countrymen, as confirmed Pizarro in a resolution which he had already taken. From his own observation of American manners during his long service in the New World, as well as from the advantages which Cortes had derived from seizing Montezuma, he knew of what consequence it was to have the Inca in his power. For this purpose, he formed a plan as daring as it was perfidious. Notwithstanding the character he had assumed of an ambassador from a powerful monarch, who courted an alliance with the Inca, and in violation of the repeated offers which he had made to him of his own friendship and assistance, he determined to avail himself of the unsuspecting simplicity with which Atabalipa relied on his professions, and to seize his person during the interview to which he had invited him. He prepared for the execution of his scheme with the same deliberate arrangement, and with as little compunction, as if it had reflected no disgrace on himself or his country. He divided his cavalry into three small squadrons, under the command of his brother Ferdinand, Soto, and Benalcazar; his infantry was formed into one body, except 20 of most tried courage, whom he kept near his own person to support him in the dangerous service which he reserved for himself; the artillery, consisting of two field-pieces, and the cross-bow men, were placed opposite to the avenue by which Atabalipa was to approach. All were commanded to keep within the square, and not to move until the signal for action was given.

Early in the morning the Peruvian camp was all in motion. But as Atabalipa was solicitous to appear with the greatest splendour and magnificence in his first interview with the strangers, the preparations for this

⁷²
Perfidious
scheme of
Pizarro to
seize the
Inca.

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this were so tedious, that the day was far advanced before he began his march. Even then, left the order of the procession should be deranged, he moved so slowly, that the Spaniards became impatient and apprehensive that some suspicion of their intention might be the cause of this delay. In order to remove this, Pizarro dispatched one of his officers with fresh assurances of his friendly disposition. At length the Inca approached. First of all appeared 400 men in an uniform dress, as harbingers to clear the way before him. He himself, sitting on a throne or couch, adorned with plumes of various colours, and almost covered with plates of gold and silver enriched with precious stones, was carried on the shoulders of his principal attendants. Behind him came some chief officers of his court, carried in the same manner. Several bands of fingers and dancers accompanied this cavalcade; and the whole plain was covered with troops, amounting to more than 30,000 men.

As the Inca drew near the Spanish quarters, father Vincent Valverde, chaplain to the expedition, advanced with a crucifix in one hand, and a breviary in the other, and in a long discourse explained to him the doctrine of the creation, the fall of Adam, the incarnation, the sufferings and resurrection of Jesus Christ, the appointment of St Peter as God's viceroy on earth, the transmission of his apostolical power by succession to the popes, the donation made to the king of Castile by pope Alexander of all the regions in the New World. In consequence of all this, he required Atabalipa to embrace the Christian faith, to acknowledge the supreme jurisdiction of the pope, and to submit to the king of Castile as his lawful sovereign; promising, if he complied instantly with this requisition, that the Castilian monarch would protect his dominions, and permit him to continue in the exercise of his royal authority; but if he should impiously refuse to obey this summons, he denounced war against him in his master's name, and threatened him with the most dreadful effects of his vengeance.

This strange harangue, unfolding deep mysteries, and alluding to unknown facts, of which no power of eloquence could have conveyed at once a distinct idea to an American, was so lamely translated by an unskilful interpreter, little acquainted with the idiom of the Spanish tongue, and incapable of expressing himself with propriety in the language of the Inca, that its general tenor was altogether incomprehensible to Atabalipa. Some parts in it of more obvious meaning, filled him with astonishment and indignation. His reply, however, was temperate. He began with observing, that he was lord of the dominions over which he reigned by hereditary succession; and added, that he could not conceive how a foreign priest should pretend to dispose of territories which did not belong to him; that if such a preposterous grant had been made, he, who was the rightful possessor, refused to confirm it; that he had no inclination to renounce the religious institutions established by his ancestors; nor would he forsake the service of the sun, the immortal divinity whom he and his people revered, in order to worship the God of the Spaniards, who was subject to death; that with respect to other matters contained in his discourse, as he had never heard of them before, and did not now understand their meaning, he desired to know

where he had learned things so extraordinary. "In this book," answered Valverde, reaching out to him his breviary. The Inca opened it eagerly; and turning over the leaves, lifted it to his ear: "This," says he, "is silent; it tells me nothing;" and threw it with disdain to the ground. The enraged monk, running towards his countrymen, cried out, "To arms, Christians, to arms; the word of God is insulted; avenge this profanation on those impious dogs."

Pizarro, who, during this long conference, had with difficulty restrained his soldiers, eager to seize the rich spoils of which they had now so near a view, immediately gave the signal of assault. At once the martial music struck up, the cannon and muskets began to fire, the horse fellied out fiercely to the charge, the infantry rushed on sword in hand. The Peruvians, astonished at the suddenness of an attack which they did not expect, and dismayed with the destructive effects of the fire-arms, and the irresistible impression of the cavalry, fled with universal consternation on every side, without attempting either to annoy the enemy, or to defend themselves. Pizarro, at the head of his chosen band, advanced directly towards the Inca; and though his nobles crowded around him with officious zeal, and fell in numbers at his feet, while they vied one with another in sacrificing their own lives, that they might cover the sacred person of their sovereign, the Spaniards soon penetrated to the royal seat; and Pizarro seizing the Inca by the arm, dragged him to the ground, and carried him as a prisoner to his quarters. The fate of the monarch increased the precipitate flight of his followers. The Spaniards pursued them towards every quarter, and, with deliberate and unrelenting barbarity, continued to slaughter wretched fugitives, who never once offered at resistance. The carnage did not cease until the close of day. Above 4000 Peruvians were killed. Not a single Spaniard fell, nor was one wounded but Pizarro himself, whose hand was slightly hurt by one of his own soldiers, while struggling eagerly to lay hold on the Inca.

The plunder taken on this occasion was immense, but the Spaniards were still unsatisfied; which being observed by the Inca, he endeavoured to apply himself to their ruling passion, avarice, in order to obtain his liberty; and therefore offered such a ransom as astonished them, even after all they knew concerning the opulence of the country. The apartment in which he was confined was 22 feet in length and 16 in breadth; and all this space he engaged to fill with vessels of gold as high as he could reach. This proposal was eagerly caught by Pizarro, and a line was drawn upon the walls to mark the stipulated height.

Atabalipa, charmed with the thoughts of liberty, immediately set about performing his part of the agreement, and dispatched messengers into all parts of the empire, in order to collect the immense quantity of gold which he had promised; and though the unfortunate monarch was now in the hands of his enemies, such was the veneration which his subjects had for him, that his orders were obeyed with as great alacrity as though he had been at full liberty; while he, in the mean time, flattering himself with the hopes of being soon released, made no preparations for expelling the invaders from his dominions.

In a short time, Pizarro received intelligence that

Peru.

13
Atabalipa
seized by
Pizarro.

14
He offers
an immense
sum for his
liberty.

Peru.

Almagro was arrived at St Michael with a reinforcement equal to the force he had with him. This was a matter of great joy to the Spaniards, and no small vexation to Atabalipa, who now considered his kingdom as in danger of being totally over-run by these strangers, whose force he neither knew, nor the means they had of transporting themselves. For this reason he determined to put his brother Huascar to death, lest he should join the strangers against him. To this he was the rather inclined, as he had got information that the captive prince had been making applications to them, and had offered them a much larger sum than what was stipulated for the Inca's ransom; and in consequence of this determination the unfortunate prince lost his life.

In the mean time, the Indians daily arrived at Caxamalca with vast quantities of treasure; the sight of which so much inflamed the Spaniards, that they insisted upon an immediate division: and this being complied with, there fell to the share of each horseman 8000 pesos, at that time not inferior to the value of as many pounds sterling in the present century, and half as much to each foot-soldier, Pizarro and his officers receiving shares proportionable to their dignity. A fifth part was reserved for the emperor, together with some vessels of curious workmanship as a present. In consequence of this immense acquisition of wealth, many of the Spaniards became clamorous for their discharge; which was readily granted by their general, as well knowing that the display of their riches would not fail to allure adventurers more hardy, though less opulent, to his standard.

15
Pizarro resolves to put the Inca to death.

After this division of the spoil, Atabalipa was very importunate with Pizarro in order to recover his liberty; but the Spaniard, with unparallelled treachery and cruelty, had now determined to put him to death. To this he was urged by Almagro's soldiers, who, though they had received an equal share with the rest, were still unsatisfied. The Inca's ransom had not been completed; and they were apprehensive, that whatever sums might afterwards be brought in, the troops of Pizarro would appropriate them to themselves as part of that ransom. They insisted with Pizarro, therefore, to put him to death, that all the adventurers might for the future be on an equal footing. Accounts were likewise received that troops were assembling in the remote provinces of the empire, which Pizarro suspected to be done by the Inca's orders. These accounts were heightened by one Philipillo an Indian interpreter, who had conceived a passion for one of the unhappy monarch's wives; and for that reason wished to have him put to death. Atabalipa himself, too, had the misfortune to hasten his own ruin by his conceiving a contemptuous notion of Pizarro, which he had not the precaution to conceal. He had long admired the European arts of reading and writing, and wished much to know whether he should regard it as a natural or acquired talent. In order to determine this, he desired one of the soldiers who guarded him to write the name of God upon the nail of his thumb. This he shewed to several Spaniards successively, asking its meaning; and, to his surprise, they all returned the same answer. At length Pizarro entered; and, on presenting it to him, he blushed, and was obliged to own his ignorance;

which inspired the Inca with the contemptuous notion of him abovementioned.

Peru.

In order, however, to give some shew of justice to such a detestable action, and that he might be exempted from standing singly as the perpetrator, Pizarro resolved to accuse the Inca of some capital crime, ed.

16
Atabalipa accused and condemned.

and institute a court of judicature for the purpose of trying him. For this purpose, he appointed himself and Almagro, with two assistants, as judges, with full powers to acquit or condemn: an attorney-general was named to carry on the prosecution in the king's name; counsellors were chosen to assist the prisoner in his defence; and clerks were ordained to record the proceedings of court. Before this strange tribunal, a charge was exhibited still more amazing. It consisted of various articles: that Atabalipa, though a bastard, had dispossessed the lawful owner of the throne, and usurped the regal power; that he had put his brother and lawful sovereign to death; that he was an idolater, and had not only permitted, but commanded the offering up of human sacrifices; that he had a great number of concubines; that since his imprisonment, he had wasted and embezzled the royal treasures, which now belonged of right to the conquerors; and that he had excited his subjects to take up arms against the Spaniards. On these heads of accusation they proceeded to try the sovereign of a great empire, over whom they had no jurisdiction. To all these charges the Inca pleaded not guilty. With respect to the death of his brother, he alleged, that the Spaniards could take no cognizance of the fact. With regard to the taxes which he had levied, and the wars he had carried on, they were nothing to the Spaniards; and as to the conspiracy against the Spaniards, he utterly denied it. He called heaven and earth to witness the integrity of his conduct, and how faithfully he had performed his engagements, and the perfidy of his accusers. He desired to be sent over to Spain to take his trial before the emperor; but no regard was paid to his intreaties; he was condemned to be burnt alive; which cruel sentence was mitigated, led.

17
And strange.

as a great favour, to strangling; and the unhappy monarch was executed without mercy. The death of the Inca was followed by a revolution in the Spanish affairs, who now became generally odious. Hateful cries were set up by his women as the funeral procession passed by their apartment: many offered to bury themselves alive with him; and on being hindered, strangled themselves out of grief and vexation. The whole town of Caxamalca was filled with lamentation, which quickly extended itself over revolt of the whole kingdom. Friends and enemies accused the Spaniards of inhumanity and treachery. Loads of gold that were coming to Caxamalca by order of the deceased Inca were now stopped; and the loss of the treasure was the first unfortunate consequence which the Spaniards felt from their late iniquitous conduct. The two factions of Indians united against Pizarro; and many of the Spaniards not only exclaimed against the cruelty of the invaders, but would even have mutinied, had not a sense of the impending danger kept them quiet. At Cuzco the friends of the emperor Huascar proclaimed Mango Capac the legitimate brother of the late Inca, determining to support him to the last against all the machinations of his enemies.

18
A general of the Peruvians.

Pizarro,

Peru.

Pizarro, in the mean time, set up *Tapapa*, the son of *Atabalipa*, causing him to be treated with all the honours due to an emperor. Immediately he set out for *Cuzco*, the gaining of which was absolutely necessary for his design. An army of Indians occupied the passes, and resolved to dispute his progress. The contest, however, was soon decided; the Spanish cavalry bore down every thing before them, and great numbers of Indians were slain. The conquerors gained a considerable booty; and Pizarro dispatched *Almagro* to reduce *Cuzco*, while he himself founded a new colony in the fruitful valley of *Xauna*; which, however, was not permanent, being afterwards removed to the place where *Lima* now stands.

While Pizarro was thus employed, another commander, named *Ferdinando Soto*, was detached with 60 horse to make the best of his way to *Cuzco*, and clear the road for the march of the remainder of the army. He was opposed by a formidable collection of Indians, who had fortified themselves in order to defend a pass against him; for which reason, fearing lest his strength might be unequal, he sent a message to Pizarro, desiring that the *Inca* might join him, thinking that his presence would awe the Peruvians, and prevent the further effusion of blood; but his expectations were frustrated by the death of the *Inca*, which happened about this time; so that there was now a necessity for having recourse to arms; for as the Spaniards set up no person in his room, the title of *Mango Capac* was universally acknowledged.

In the mean time, a new supply of soldiers arriving from Spain, *Benalcázar*, governor of *St Michael*, undertook an expedition against *Quito*, where, according to the report of the natives, *Atabalipa* had left the greatest part of his treasure. He accomplished his purpose with very great difficulty, having a country covered with rocks and mountains to pass, and being opposed by large bodies of the natives. But when he got possession of the city, to his extreme mortification, he found that the inhabitants had carried off all their gold and silver; for they being now acquainted with the ruling passion of the Spaniards, had taken care to disappoint it, by removing the treasures which they knew very well had been the cause of the expedition.

About the same time, *Alvarado*, governor of *Guatemala*, invaded the province of *Chili*. In this expedition his troops endured such hardships, and suffered so much from the cold among the Andes, that a fifth part of the men and all the horses died, and at the same time the rest were so much dispirited and emaciated, that they became quite unfit for service. What was worst of all, when they had arrived at the end of their journey, they met with a body of Spaniards drawn up in hostile array to oppose them. These had been sent against him by Pizarro, who claimed *Chili* as part of his jurisdiction, and were now joined by *Benalcázar*, with the troops under his command. *Alvarado*, however, advanced boldly to the attack; but, on the interposition of some moderate men in each party, the difference was accommodated; *Alvarado* engaged to return to his government, upon his being paid 100,000 pesos to defray the expence of his armament; however, most of his followers remained in the country, and enlisted in the service of Pizarro,

In the mean time *Ferdinand Pizarro*, the brother of the general, had landed in Spain, where he produced such immense quantities of gold and silver as astonished the court, even after all they had seen of the wealth of their new-discovered territories. The general's authority was confirmed to him with new powers and privileges, and the addition of 70 leagues extending along the coast, to the southward of the territory granted in his former patent. *Almagro* had the title of *adelantado* or governor conferred upon him, with jurisdiction over 200 leagues of a country lying southward from the province allotted to Pizarro; he himself was made a knight of the order of *St Jago*.

Of these transactions some accounts were received at Peru before the arrival of *Ferdinand Pizarro* himself; and no sooner did *Almagro* hear that he had obtained the royal grant of an independent government, than, pretending that *Cuzco*, the capital of all Peru, lay within his jurisdiction, he attempted to seize it. Pizarro was no less ready to oppose him; and a very dangerous civil war was about to take place, when the quarrel was made up, on condition that *Almagro* should attempt the conquest of *Chili*; and if he did not find there an establishment equivalent to his expectations, Pizarro should yield up to him part of Peru.

By this reconciliation Pizarro was left at liberty to settle the internal policy of his province, which, though little qualified for a legislator, he attempted, by dividing the country into various districts, appointing magistrates to preside in each, and establishing such regulations concerning the administration of justice, the royal revenue, &c. as occurred to him. The seat of government he removed from *Cuzco* to *Lima*, which he named *Ciudad del Rey*, and which name it still retains among the Spaniards in all legal and formal deeds. Its other name, *Lima*, is a corruption of *Rimac*, the name of the valley in which the city stands.

In the mean time *Almagro* had set out on his expedition to *Chili*; the event of which has been related under the article *CHILI*; and while he was thus employed, Pizarro encouraged some of his most distinguished officers to invade those provinces of the empire which had not yet been visited by the Spaniards. This he did with a view to keep them employed, and prevent tumults; but it was attended with very terrible consequences. No sooner did *Mango Capac* the *Inca* perceive the security of the Spaniards in thus dividing their forces, than he seized the opportunity of making one vigorous effort to redress the wrongs of himself and his countrymen, and expel the invaders, who had tyrannized in such a cruel manner. Though strictly guarded by the Spaniards, he found means to communicate his intentions to the chief men of his nation, whom he joined in the year 1536, under pretence of celebrating a festival which he had obtained liberty from Pizarro to attend. Upon this the standard of a dreadful war was immediately erected, and a most formidable army, according to the Spanish historians, of 200,000 men collected. Many Spaniards were massacred in their habitations, and several detachments entirely cut off; and while this vast army laid siege to *Cuzco*, another formidable body invested *Lima*, and kept the governor closely shut up. The greatest effort, however,

Peru.

21
Honours
conferred
on Pizarro
by the court
of Spain.

29
Chili invaded
by Alvarado.

30
He is obliged by Pizarro to abandon the enterprise.

22
A dreadful
infurrection
of the Peruvians,

Peru.

was made against Cuzco, which was defended by Pizarro and his two brothers, with only 170 men. The siege lasted nine months; many of the Spaniards were killed; among whom was Juan Pizarro, the general's brother, and the best beloved of them all. The rest were reduced to the most desperate situation, when Almagro appeared suddenly in the neighbourhood of Cuzco. He had received such accounts of the insurrection in Peru, as would at any rate have determined him to return to the assistance of Pizarro; but besides this, he had now received the royal patent, creating him governor of Chili, and deemed it certain beyond all contradiction, that Cuzco lay within his jurisdiction; for which reason he hastened to prevent it from falling into the hands of the Peruvians. On his arrival his assistance was solicited by both parties. The Inca made many advantageous proposals; but at length despairing of obtaining any cordial union with a Spaniard, he attacked him in the night by surprise with a great body of chosen troops. But the Spanish valour and discipline prevailed against all the numbers of their enemies; and the Peruvians were repulsed with such slaughter, that a great part of the remainder dispersed, and Almagro advanced to the gates of Cuzco without opposition. Pizarro's brothers took measures to oppose his entrance; but prudence for the present restrained both parties from entering into a civil war while they were surrounded with enemies; and therefore each leader endeavoured to corrupt the followers of his antagonist. In this Almagro had the advantage; and so many of Pizarro's troops deserted in the night, that Almagro was encouraged to advance towards the city, where he surprised the sentinels; and investing the house where the two brothers were lodged, he compelled them, after an obstinate defence, to surrender at discretion; and Almagro's authority over Cuzco was immediately recognized as authentic.

²³
They are
defeated,
and dis-
perse.

²⁴
Civil war
between
Pizarro and
Almagro.

In this fray only two or three persons were killed; but matters soon began to wear a more serious aspect. Francis Pizarro, having dispersed the Peruvians who invested Lima, and received considerable reinforcements from other provinces, ordered 500 men under the command of Alonso de Alvarado to march to Cuzco, in hopes of relieving his brothers, if they were not already cut off. They advanced to a small distance from the capital, before they knew that they had a more formidable enemy than the Indians to encounter. When they saw their countrymen drawn up on the banks of a river to oppose them, they were greatly surprised; however, Almagro, who wished rather to gain them than to fight, began with attempting to seduce their leader. Alvarado could not by any means be gained over; but being inferior in military skill, Almagro attacked him by surprise, entirely defeated and dispersed his army, taking himself and some of his principal officers prisoners.

This victory seemed decisive; and Almagro was advised to make it so by putting to death Gonzalo and Ferdinand Pizarros, Alvarado, and some others whom he could not hope to gain. This advice, however, he declined from motives of humanity, and a desire of making his adversary appear the aggressor. For these reasons, instead of marching directly against Pizarro, he retired quietly to Cuzco; which gave his adversary time to recollect himself from the disorder into which

the news of so many disasters had thrown him. He began again to practise upon Almagro those arts which had before proved successful; and Almagro again suffered himself to be deceived by pretended offers of pacification. The negotiations for this purpose were protracted for several months; and while Almagro was employed in detecting and eluding the fraudulent intentions of the governor, Gonzalo Pizarro and Alvarado found means to corrupt the soldiers who guarded them, and not only made their own escape, but persuaded 60 of Almagro's men to accompany them. There now remained only Ferdinand Pizarro in the hands of Almagro; and he was delivered by another act of treachery. The general proposed that all points of controversy should be submitted to the decision of their sovereign; and that Ferdinand Pizarro should be instantly set at liberty, and return to Spain, together with some other officers whom the general proposed to send over to shew the justice of his claims. Though the intention of Pizarro by making this proposal was evident, Almagro was deceived by it, and released those whom Pizarro wanted; which he had no sooner done, than the latter threw off all disguise, and openly declared, that arms alone must now decide the matter between them. He therefore immediately set out for Cuzco with an army of 700 men, to which Almagro had only 500 to oppose. From the weakness of his forces, probably, Almagro did not attempt to guard some strong passes, through which Pizarro had to march, but waited patiently for his adversary in a plain open country.

In the mean time, Pizarro advanced without any obstruction from his enemy; and an engagement soon happened, in which Almagro was defeated and taken prisoner. The conquerors behaved with great cruelty, massacring a great number of officers, and treating Almagro himself with great severity. The Indians had assembled in great numbers to see the battle, with an intention to join the vanquished party; but were so much overawed by the Spaniards, that they retired quietly after the battle was over, and thus lost the only opportunity they ever had of expelling their tyrants.—Almagro, after having for some months languished in prison, was at length formally tried, and condemned to die by Pizarro. Notwithstanding his consummate bravery for which he was remarkable, this hardy veteran could not bear the deliberate approach of death, but descended to use intreaties to save his life. The Pizarros, however, continued inflexible; and he was first strangled in prison, and then publicly beheaded. He left one son by an Indian woman, whom he appointed his successor, by virtue of a power granted him by the emperor.

As during these dissensions all intercourse with Spain ceased, it was some time before the accounts of the civil war were received at court. The first intelligence was given by some of Almagro's soldiers, who had left America on the ruin of their cause; and they did not fail to represent the injustice and violence of Pizarro in the strongest colours, which strongly prejudiced the emperor against him. In a short time, however, Ferdinand Pizarro arrived, and endeavoured to give matters a new turn. The emperor was uncertain which of them he ought to believe; and therefore thought it necessary to send over some person with ample powers

Peru.

²⁵
Almagro
defeated
and taken
prisoner.

²⁶
And strange-
ly.

Peru.

to inquire into the merits of the cause, and to determine certainly who was in the wrong. If he found the governor still alive, he was to assume only the title of judge, in order to have the appearance of acting in concert with him; but if he was dead, the viceroy might then produce his commission appointing him Pizarro's successor in the government. This compliance to Pizarro, however, proceeded more from a dread of his power than from any other thing; for in the mean time, his brother Ferdinand was arrested at Madrid, and confined to a prison, where he remained above 20 years. The person nominated to this important trust was Christoval Vaco de Castro.

27
Peru divided by Pizarro among his associates.

While this gentleman was preparing for his voyage, Pizarro, considering himself as the unrivalled master of Peru, proceeded to parcel out its territories among the conquerors; and had this division made with any degree of impartiality, the extent of country which he had to bestow was sufficient to have gratified his friends, and to have gained his enemies. But Pizarro conducted this transaction, not with the equity and candour of a judge attentive to discover and to reward merit, but with the illiberal spirit of a party-leader. Large districts, in parts of the country most cultivated and populous, were set apart as his own property, or granted to his brothers, his adherents, and favourites. To others, lots less valuable and inviting were assigned. The followers of Almagro, amongst whom were many of the original adventurers, to whose valour and perseverance Pizarro was indebted for his success, were totally excluded from any portion in those lands, towards the acquisition of which they had contributed so largely. As the vanity of every individual sets an immoderate value upon his own services, and the idea of each, concerning the recompence due to them, rose gradually to a more exorbitant height in proportion as their conquests extended, all who were disappointed in their expectations exclaimed loudly against the rapaciousness and partiality of the governor. The partisans of Almagro murmured in secret, and meditated revenge.

Rapid as the progress of the Spaniards in South America had been since Pizarro landed in Peru, their avidity of dominion was not yet satisfied. The officers to whom Ferdinand Pizarro gave the command of different detachments, penetrated into several new provinces; and though some of them were exposed to great hardships in the cold and barren regions of the Andes, and others suffered distress not inferior amidst the woods and marshes of the plains, they made discoveries and conquests which extended their knowledge of the country, as well as added to their power. Pedro de Valdivia re-assumed Almagro's scheme of invading Chili; and, notwithstanding the fortitude of the natives in defending their possessions, made such progress in the conquest of the country, that he founded the city of St Jago, and gave a beginning to the establishment of the Spanish dominion there. But of all the enterprises undertaken about this period, that of

28
Expedition of Gonzales Pizarro.

Gonzales Pizarro was the most remarkable. The governor, who seems to have resolved that no person in Peru should possess any station of distinguished eminence or authority but those of his own family, had deprived Benalcazar, the conqueror of Quito, of his command in that kingdom, and appointed his brother

Gonzalo to take the government of it. He instructed him to attempt the discovery and conquest of the country to the east of the Andes; which, according to the information of the Indians, abounded with cinnamon and other valuable spices. Gonzales, not inferior to any of his brothers in courage, and no less ambitious of acquiring distinction, eagerly engaged in this difficult service. He set out from Quito at the head of 340 soldiers, near one half of whom were horsemen, with 4000 Indians to carry their provisions. In forcing their way through the defiles, or over the ridges of the Andes, excels of cold and fatigue, to neither of which they were accustomed, proved fatal to the greater part of the wretched attendants. The Spaniards, tho' more robust, and inured to a variety of climates, suffered considerably, and lost some men; but when they descended into the low country, their distress increased. During two months it rained incessantly, without any interval of fair weather long enough to dry their cloaths. The vast plains upon which they were now entering, either altogether without inhabitants, or occupied by the rudest and least industrious tribes in the New World, yielded little subsistence. They could not advance a step but as they cut a road through woods, or made it through marshes. Such incessant toil, and continual scarcity of food, seem more than sufficient to have exhausted and dispirited any troops. But the fortitude and perseverance of the Spaniards in the 16th century were insuperable. Allured by frequent but false accounts of rich countries before them, they persisted in struggling on, until they reached the banks of the Coca or Napo, one of the large rivers whose waters pour into the Maragron, and contribute to its grandeur. There, with infinite labour, they built a bark, which they expected would prove of great utility, both in conveying them over rivers, in procuring provisions, and in exploring the country. This was manned with 50 soldiers, under the command of Francis Orellana, the officer next in rank to Pizarro. The stream carried them down with such rapidity, that they were soon far a-head of their countrymen, who followed slowly and with difficulty by land.

At this distance from his commander, Orellana, a young man of an aspiring mind, began to fancy himself independent; and, transported with the predominant passion of the age, he formed the scheme of distinguishing himself as a discoverer, by following the course of the Maragron until it joined the ocean, and by surveying the vast regions through which it flows. This scheme of Orellana's was as bold as it was treacherous. For, if he be chargeable with the guilt of having violated his duty to his commander, and with having abandoned his fellow-soldiers in a pathless desert, where they had hardly any hopes of success, or even of safety, but what were founded on the service which they expected from the bark, his crime is, in some measure, balanced by the glory of having ventured upon a navigation of near 2000 leagues, through unknown nations, in a vessel hastily constructed with green timber, and by very unskilful hands, without provisions, without a compass, or a pilot. But his courage and alacrity supplied every defect. Committing himself fearlessly to the guidance of the stream, the Napo bore him along to the south, until he reached the great channel of the Maragron. Turning with it towards

Peru.

29

a Orellana falls down the river Maragron, and descends Pizarro.

the.

the coast, he held on his course in that direction. He made frequent descents on both sides the river, sometimes seizing by force of arms the provisions of the fierce savages seated on its banks, and sometimes procuring a supply of food by a friendly intercourse with more gentle tribes. After a long series of dangers, and which he encountered with amazing fortitude, and of distresses which he supported with no less magnanimity, he reached the ocean, where new perils awaited him. These he likewise surmounted, and got safe to the Spanish settlement in the island Cubagua; from thence he failed to Spain. The vanity natural to travellers who visit regions unknown to the rest of mankind, and the art of an adventurer, solicitous to magnify his own merit, concurred in prompting him to mingle an extraordinary proportion of the marvellous in the narrative of his voyage. He pretended to have discovered nations so rich, that the roofs of their temples were covered with plates of gold; and described a republic of women so warlike and powerful, as to have extended their dominion over a considerable tract of the fertile plains which he had visited. Extravagant as those tales were, they gave rise to an opinion, that a region abounding with gold, distinguished by the name of *El Dorado*, and a community of Amazons, were to be found in this part of the New World; and such is the propensity of mankind to believe what is wonderful, that it has been slowly, and with difficulty, that reason and observation have exploded those fables. The voyage, however, even when stripped of every romantic embellishment, deserves to be recorded, not only as one of the most memorable occurrences in that adventurous age, but as the first event that led to any certain knowledge of those immense regions that stretch eastward from the Andes to the ocean.

No words can describe the consternation of Pizarro, when he did not find the bark at the confluence of the Napo and Maragnon, where he had ordered Orellana to wait for him. He would not allow himself to suspect that a man, whom he had entrusted with such an important command, could be so base and so unfeeling as to desert him at such a juncture. But imputing his absence from the place of rendezvous to some unknown accident, he advanced above 50 leagues along the banks of the Maragnon, expecting every moment to see the bark appear with a supply of provisions. At length he came up with an officer whom Orellana had left to perish in the desert, because he had the courage to remonstrate against his perfidy. From him he learned the extent of Orellana's crime; and his followers perceived at once their own desperate situation, when deprived of their only resource. The spirit of the stoutest hearted veteran sunk within him; and all demanded to be led back instantly. Pizarro, though he assumed an appearance of tranquillity, did not oppose their inclination. But he was now 1200 miles from Quito; and in that long march the Spaniards encountered hardships greater than those they had endured in their progress outward, without the alluring hopes which then soothed and animated them under their sufferings. Hunger compelled them to feed on roots and berries, to eat all their dogs and horses, to devour the most loathsome reptiles, and even to gnaw the leather of their saddles and sword-belts. Four thousand Indians, and 210 Spaniards, perished in this wild and

disastrous expedition, which continued near two years; and as 50 men were aboard the bark with Orellana, only 80 got back to Quito. These were naked like savages, and so emaciated with famine, or worn out with fatigue, that they had more the appearance of spectres than of men.

But, instead of returning to enjoy the repose which his condition required, Pizarro, on entering Quito, received accounts of a fatal event that threatened calamities more dreadful to him than those through which he had passed. From the time that his brother made that partial division of his conquests which has been mentioned, the adherents of Almagro, considering themselves as proscribed by the party in power, no longer entertained any hope of bettering their condition. Great numbers in despair resorted to Lima, where the house of young Almagro was always open to them; and the slender portion of his father's fortune, which the governor allowed him to enjoy, was spent in affording them subsistence. The warm attachment with which every person who served under the elder Almagro devoted himself to his interests, was quickly transferred to his son, who was now grown up to the age of manhood, and possessed all the qualities which captivate the affections of soldiers. Of a graceful appearance, dextrous at all martial exercises, bold, open, generous, he seemed to be formed for command; and as his father, conscious of his own inferiority from the total want of education, had been extremely attentive to have him instructed in every science becoming a gentleman; the accomplishments which he had acquired heightened the respect of his followers, as they gave him distinction and eminence among illiterate adventurers. In this young man the Almagrians found a point of union which they wanted; and looking up to him as their head, were ready to undertake any thing for his advancement. Nor was affection for Almagro their only incitement; they were urged on by their own distresses. Many of them, destitute of common necessities, and weary of loitering away life, a burden to their chief, or to such of their associates as had saved some remnant of their fortune from pillage and confiscation, longed impatiently for an occasion to exert their activity and courage, and began to deliberate how they might be avenged on the author of all their misery. Their frequent cabals did not pass unobserved; and the governor was warned to be on his guard against men who meditated some desperate deed, and had resolution to execute it. But, either from the native intrepidity of his mind, or from contempt of persons whose poverty rendered their machinations of little consequence, he disregarded the admonitions of his friends. "Be in no pain (said he carelessly) about my life; it is perfectly safe, as long as every man in Peru knows that I can in a moment put him to death who dares to harbour a thought against it." This security gave the Almagrians full leisure to digest and ripen every part of their scheme; and Juan de Herada, an officer of great abilities, who had the charge of Almagro's education, took the lead in their consultations, with all the zeal which that connection inspired, and with all the authority which the ascendant that he was known to have over the mind of his pupil gave him.

On Sunday, the 26th of June, at mid-day, the season

37
A conspiracy formed against the governor.

30
Extreme distresses of Gonzalo Pizarro and his men.

Peru. son of tranquillity and repose in all sultry climates, Herrada, at the head of 18 of the most determined conspirators, sallied out of Almagro's house in complete armour; and drawing their swords, as they advanced hastily towards the governor's palace, cried out, "Long live the king, but let the tyrant die." Their associates, warned of their motions by a signal, were in arms at different stations ready to support them. Though Pizarro was usually surrounded by such a numerous train of attendants as suited the magnificence of the most opulent subject of the age in which he lived, yet as he was just risen from table, and most of his own domestics had retired to their own apartments, the conspirators passed through the two outer courts of the palace unobserved. They were at the bottom of the stair-case, before a page in waiting could give the alarm to his master, who was conversing with a few friends in a large hall. The governor, whose steady mind no form of danger could appal, starting up, called for arms, and commanded Francisco de Chaves to make fast the door. But that officer, who did not retain so much presence of mind as to obey this prudent order, running to the top of the stair-case, wildly asked the conspirators what they meant, and whither they were going? Instead of answering, they stabbed him to the heart, and burst into the hall. Some of the persons who were there threw themselves from the windows; others attempted to fly; and a few drawing their swords, followed their leader into an inner apartment. The conspirators, animated with having the object of their vengeance now in view, rushed forward after them. Pizarro, with no other arms than his sword and buckler, defended the entry, and, supported by his half-brother Alcantara and his little knot of friends, maintained the unequal contest with intrepidity worthy of his past exploits, and with the vigour of a youthful combatant. "Courage," cried he, "companions, we are yet now to make those traitors repent of their audacity." But the armour of the conspirators protected them, while every thrust they made took effect. Alcantara fell dead at his brother's feet; his other defendants were mortally wounded. The governor, so weary that he could hardly wield his sword, and no longer able to parry the many weapons furiously aimed at him, received a deadly thrust full in his throat, sunk to the ground, and expired.

As soon as he was slain, the assassins ran out into the streets, and waving their bloody swords, proclaimed the death of the tyrant. Above 200 of their associates having joined them, they conducted young Almagro in solemn procession through the city; and assembling the magistrates and principal citizens, compelled them to acknowledge him as lawful successor to his father in his government. The palace of Pizarro, together with the houses of several of his adherents, were pillaged by the soldiers; who had the satisfaction at once of being avenged on their enemies, and of enriching themselves by the spoils of those through whose hands all the wealth of Peru had passed.

The new governor marched into the heart of the empire, in order to reduce such places as refused to acknowledge his authority. A multitude of ruffians joined him on his march. His army breathed nothing but vengeance and plunder: every thing gave way before it. If the military talents of the general had

equalled the ardour of his troops, the war had ended here. Unhappily for Almagro, he had lost his conductor John de Herrada. His inexperience made him fall into the snares that were laid for him by Pedro Alvares, who had put himself at the head of the opposite party. He lost, in attempting to unravel his plots, that time that he ought to have employed in fighting. In these circumstances, an event, which no one could have foreseen, happened to change the face of affairs.

The licentiate Vaca di Castro, who had been sent from Europe to try the murderers of old Almagro, arrived at Peru. As he was appointed to assume the government in case Pizarro was no more, all who had not sold themselves to the tyrant hastened to acknowledge him. Uncertainty and jealousy, which had for too long a time kept them dispersed, were no longer an obstacle to their re-union. Castro, who was resolute as if he had grown old in the service, did not suffer their impatience to languish, but instantly led them against the enemy. The two armies engaged at Chapas on the 16th of September 1542, and fought with inexpressible obstinacy. Victory, after having wavered a long time, at the close of the day decided in favour of that party whose cause was the most just. Those among the rebels who were most guilty, dreading to languish under disgraceful tortures, provoked the conquerors to murder them, crying out, like men in despair, *It was I who killed Pizarro*. Their chief was taken prisoner, and died on the scaffold.

While these scenes of horror were transacting in America, the Spaniards in Europe were employed in finding out expedients to terminate them; though no measures had been taken to prevent them. Peru had only been made subject to the audience of Panama, which was too remote to superintend the maintenance of good order, and had too little influence to make its decrees respected. A supreme tribunal was then established at Lima for the dispensation of justice, which was to be invested with authority sufficient to enforce and to reward a due obedience to the laws. Blasco Nunez Vela, who presided in it as viceroy, arrived in 1544, attended by his subordinates in office, and found every thing in the most dreadful disorder.

To put an end to these tumults which now subsisted, would have required a profound genius, and many other qualities which are seldom united. Nunez had none of these advantages. Nature had only given him probity, firmness, and ardour; and he had taken no pains to improve these gifts. With these virtues, which were almost defects in his situation, he began to fulfil his commission, without regard to places, persons, or circumstances.

Contrary to the opinion of all intelligent persons, who wished that he should wait for fresh instructions ^{Had con-} from Europe, he published ordinances, which declared viceroy ^{duct of the} Nunez Vela that the lands the conquerors had seized should not pass to their descendants, and which dispossessed those who had taken part in the civil commotions. All the Peruvians who had been enslaved by monks, bishops, and persons belonging to the government, were declared free. Those who belonged to other masters were to be freed from their shackles at the death of their oppressors. They could no longer be compelled to bury themselves in the mines, nor could any kind of labour

32
Who is
murdered.

Peru.

34
He is de-
fected by
Vaca di Ca-
stro.

33
Young Al-
magro
heads the
rebels.

Peru. labour be exacted from them without payment. Their tribute was fixed. The Spaniards who travelled on foot were deprived of the right of taking three Indians to carry their baggage; and those who travelled on horseback, of the right of taking five. The caciques were discharged from the obligation of furnishing the traveller and his retinue with provisions gratis. Other tyrannical establishments also would soon have been proscribed; and the conquered people were on the eve of being sheltered under the protection of laws, which would at least have tempered the rigours of the right of conquest, if even they had not entirely repaired the injustice of them; but it should seem that the Spanish government was only to be unfortunate in the good it attempted to effect.

A change to unexpected filled those with consternation who saw their fortunes wrested from them, or who lost the flattering hope of transmitting theirs to their posterity. Even those who were not affected by these interested views, being accustomed to look upon the Indians as the instruments and victims of their avarice, had no conception that any other ideas could prevail concerning them. From astonishment they proceeded to indignation, murmuring, and sedition. The viceroy was degraded, put in irons, and banished to a desert island, till he could be conveyed to Spain.

Gonzales Pizarro was then returned from his hazardous expedition, which had employed him long enough to prevent him from taking a part in those revolutions which had so rapidly succeeded each other. The anarchy he found prevailing at his return, inspired him with the idea of seizing the supreme authority. His fame and his forces made it impossible that this should be refused him; but his usurpation was marked with so many enormities, that Nunez was regretted. He was recalled from exile, and soon collected a sufficient number of forces to enable him to take the field. Civil commotions were then renewed with extreme fury by both parties. No quarter was asked or given on either side. The Indians took part in this as they had done in the preceding wars; some ranged themselves under the standard of the viceroy, others under the banners of Gonzales. From 15,000 to 20,000 of these unhappy wretches, who were scattered about in each army, dragged up the artillery, levelled the roads, carried the baggage, and destroyed one another. Their conquerors had taught them to be sanguinary. After a variety of advantages for a long time alternately obtained, fortune at length favoured the rebellion under the walls of Quito in the month of January, in the year 1545; and Nunez with the greatest part of his men were massacred.

Pizarro took the road of Lima, where they were deliberating on the ceremonies with which they should receive him. Some officers wished that a canopy should be carried for him to march under, after the manner of kings. Others, with adulation still more extravagant, pretended that part of the walls of the town, and even some houses, must be pulled down; as was the custom at Rome, when a general obtained the honours of a triumph. Gonzales contented himself with making his entrance on horseback, preceded by his lieutenant, who marched on foot. Four bishops accompanied him, and he was followed by the magi-

strates. The streets were strewn with flowers, and the air resounded with the noise of bells and various musical instruments. This homage totally turned the head of a man naturally haughty, and of confined ideas. He spoke and acted in the most despotic manner.

Had Gonzales possessed judgment and the appearance of moderation, it would have been possible for him to render himself independent. The principal persons of his party wished it. The majority would have beheld this event with indifference, and the rest would have been obliged to consent to it. Blind cruelties, insatiable avarice, and unbounded pride, altered these dispositions. Even those, whose interests were connected with those of the tyrant, wished for a deliverer.

Such a deliverer arrived from Europe in the person of the licentiate Pedro di la Gasca. The squadron of the provinces of the mountains immediately declared for a person who was invested with a lawful authority to govern them. Those who lived concealed in deserts, caverns, and forests, quitted their retreats to join him. Gonzales, who saw no resource left to support him but in some great achievement, took the road of Cuzco, with a resolution to give battle. At some leagues distance from this place he met the royal army, and attacked it on the 9th of June 1548. One of his lieutenants, seeing him abandoned at the first charge by his best foldiers, advised him to throw himself into the enemy's battalions, and perish like a Roman: but this weak man chose rather to surrender, and end his life on a scaffold. Carvajal, a more able warrior, and more ferocious than himself, was quartered. This man, when he was expiring, boasted that he had massacred with his own hand 1400 Spaniards and 20,000 Indians.

Such was the last scene of a tragedy, of which every act has been marked with blood. The government was moderate enough not to continue the prosecutions; and the remembrance of the horrid calamities they had suffered kept the Spaniards in the bounds of subjection. What still remained of that commotion that had been raised in their minds, insensibly sunk into a calm; and the country hath remained in quiet ever since.

With regard to the Peruvians, the most cruel measures were taken to render it impossible for them to rebel. Tupac Amaru, the heir of their last king, had taken refuge in some remote mountains, where he lived in peace. There he was so closely surrounded by the troops which had been sent out against him, that he was forced to surrender. The viceroy Francis de Toledo caused him to be accused of several crimes that he had not committed, and for which he was beheaded in 1571. All the other descendants of the Incas shared the same fate, under pretence that they had conspired against their conquerors. The horror of these enormities excited to universal an indignation both in the Old and the New World, that Philip II. thought himself obliged to disavow them; but the infamous policy of this prince was so notorious, that no credit was given to this appearance of his justice and humanity.

The empire of Peru, at the time it was subdued, extended along the South Sea, from the River of Emperal to Chili, and on the land side to Popayan, according

Peru.

37
Au end
put to the
troubles by
Pedro di la
Gasca.

38
Hard fate
of the Pe-
ruvians.

36
He is over-
come and
killed by
Gonzales
Pizarro.

39
Extent of
the empire.

Peru. cording to some geographers. It contained within its extent that famous chain of mountains which rises in the Terra Magellanica, and is gradually loft in Mexico, in order to unite, as it should seem, the southern parts of America with the northern. Its territory, which is very irregular, may be divided into three classes.

40
Description
of the
mountains
called Cor-
deleras.

The principal Cordeleras form the first. The summits of these, says M. de la Condamine, are loft in the clouds, and almost all of them are covered with enormous masses of snow as old as the world. From several of these summits, which have in part tumbled down, and from these immense heaps of snow, torrents of smoke and flame issue. Such are the summits of Colopaxi, Tongourargua, and Sangai. The greatest part of the rest have formerly been volcanoes, or will probably one day become such. History has only preserved to us the era of their eruptions since the discovery of America; but the pumice-stones, the calcined earths with which they are strewn, and the evident vestiges that the flame hath left, are authentic testimonies of the reality of former eruptions: their height is prodigious.

Cayambour, which is situated directly under the equator, and Antifona, which is only five leagues distant from it to the south, are more than 3000 toises high, reckoning from the level of the sea; and Chimborazo, which is near 3220 toises high, surpasses by one third the altitude of the Peak of Teneriffe, the highest mountain of the old hemisphere. Pitchincha and Caracazo, where the French Academicians made most of their observations with regard to the figure of the earth, have only 2430 and 2470 toises of absolute height; and this is the highest mountain that was ever ascended. Eternal snows have hitherto rendered summits of greater altitude inaccessible.

From this boundary, which is where the snow never melts, not even in the torrid zone, one hardly sees, in descending 100 or 150 toises down, any thing except naked rocks or dry sands: a little lower, one may perceive some moss that covers the rocks; various kinds of heath, which, though green and damp, make a clear fire; round hillocks of spongy earth, on which grow small radiated and starry plants, whose petals are like the leaves of yew. Throughout the whole of this space, the snow is only temporary; but it continues sometimes whole weeks and months. Lower still, the ground is commonly covered with a sort of loose grass, which rises a foot and a half high, or two feet. This species of hay is the proper characteristic that distinguishes the mountains which the Spaniards call *Paramos*. They only give this name to heath, or such uncultivated ground as is too high for wood to grow on it, or where the rain seldom falls otherwise than in the form of snow, tho' it immediately melts. And, lastly, in descending still lower, to the height of about 2000 toises above the level of the sea, one sees it sometimes snow and sometimes rain.

When we come down from these mountains, we find others that are less considerable, which occupy the middle of Peru. The summit of these is commonly cold, barren, and full of mines. The valleys between them are covered with numerous flocks, and seem to offer to agriculture the most copious harvests. There are seldom above two months of winter here; and in the

greatest heat we need only pass out of the sun into the shade, to enjoy the temperate zone. This rapid alternative of sensation is not, however, invariable in a climate, which, by the disposition alone of the ground, often changes in the course of a league. But let it be as it will, it is always found healthy. There is no malady peculiar to these countries, and those of our climate seldom prevail there. An European vessel, however, in 1719, brought thither an epidemic disorder, which carried off a great number of Spaniards and Mestices, and above 200,000 Indians. A more fatal present still, which these people have received in exchange for their gold, is the small-pox. It shewed itself here for the first time in 1588, and has not failed since to make at intervals inexorable ravages.

The people are not less exposed to this fatal distemper on the coasts known by the name of *valleys*. Their temperature is not the same as is elsewhere found in the same latitude. It is very agreeable; and, though the four seasons of the year are sensibly felt here, there is none that can with propriety be deemed inconvenient. The winter is the most strongly marked. This has been accounted for by the winds of the south pole, which bring along with them the impression of those snows and that ice from which they first came: but this they preserve only in part, because they blow while a thick fog lies upon the earth. In reality, these gross vapours never regularly rise till towards noon: but it is seldom that they disperse. The sky commonly continues so much covered with them, that the rays of the sun, which sometimes appear, can only in a very slight manner mitigate the cold.

Whatever may be the cause of so regular a winter under the torrid zone, it is certain that these valleys, which are covered with heaps of sand, are absolutely barren for a space of more than 100 leagues, from Truxillo to Lima. The rest of the coast is less sandy, but it is still too much so to be fruitful. No fields are there found that can be styled *fertile*, except in such lands as are watered by the streams which descend from the mountains.

Rain might contribute to impart to the soil the fertility of which it is destitute; but it is never known to rain in Lower Peru. Natural philosophy has exerted its efforts in vain to discover the cause of a phenomenon so extraordinary. To this it is owing, that the houses, though only built of crude brick, or of earth mixed with a little grass, are of very long duration. Their covering is only a simple matting, placed horizontally, with a layer of ashes an inch deep above, to absorb the moisture of the fog.

The same reasons that prevent its raining in the valleys, undoubtedly also hinder storms. Those of their inhabitants who never travelled in the mountains, are perfect strangers to thunder and lightning. Their terror is equal to their astonishment, when, out of their country, they first behold so uncommon a spectacle.

But they have a phenomenon much more dangerous and dreadful, and which, in its consequences, leaves much deeper impressions in the human imagination than thunder and the ravages that accompany it. Earthquakes, which in other countries are so rare, that whole generations pass without beholding one, are so common in the valleys of Peru, that they have there contracted an habit of reckoning them as a se-

Peru.

41
Climate,
&c.

Peru.

ries of dates; and they are so much the more memorable, as their frequent return does not diminish their violence. There are few places on this extensive coast which do not present most dreadful monuments of these horrible convulsions of the earth.

42
How the
country was
originally
settled by
the Spaniards.

At the time when the first conquests were made, when emigrations were most frequent, the country of the Incas had a much greater reputation for riches than New Spain; and, in reality, for a long time much more considerable treasures were brought away from it. The desire of partaking of them must necessarily draw thither, as was really the case, a greater number of Castilians. Though they all almost went over there with the hope of returning to their country to enjoy the fortune they might acquire, yet the majority of them settled in the colony. They were induced to this by the softness of the climate, the salubrity of the air, and the goodness of the provisions. Mexico presented not the same advantages, and did not give them reason to expect so much independence as a land infinitely more remote from the mother-country.

Cusco attracted the conquerors in multitudes. They found this capital built on a ground that was very irregular, and divided into as many quarters as there were provinces in the empire. Each of the inhabitants might follow the usages of his native country; but every body was obliged to conform to the worship established by the founder of the monarchy. There was no edifice that had any grandeur, elegance, or convenience; because the people were ignorant of the first elements of architecture. The magnificence of what they called the *palace of the sovereign, of the princes of the blood, and of the great men of his empire*, consisted in the profusion of the metals that were lavished in decorating them. The temple of the Sun was distinguished above all other edifices; its walls were inlaid or sheathed with gold and silver, ornamented with divers figures, and loaded with the idols of all the nations whom the Incas had enlightened and subdued.

As it was not a solicitude for their own preservation which occupied the Spaniards at first, they had no sooner pillaged the immense riches which had been amassed at Cusco for four centuries, than they went in great numbers in 1534, under the order of Sebastian de Benalcazar, to undertake the destruction of Quito. The other towns and boroughs of the empire were over-run with the same spirit of rapine; and the citizens and the temples were plundered in all parts.

Those of the conquerors, who did not take up their residence in the settlements which they found already formed, built towns on the sea-coasts, where before there were none: for the sterility of the soil had not permitted the Peruvians to multiply much there; and they had not been induced to remove thither from the extremity of their country, because they failed very little. Paiza, Truxillo, Callao, Pisco, and Arica, were the roads which the Spaniards deemed most convenient for the communication they intended to establish among themselves and with the mother-country. The different positions of these new cities determined the degree of their prosperity.

Those which were afterwards built in the inland parts of the country were not erected in regions which presented a fertile soil, copious harvests, excellent pa-

tures, a mild and salubrious climate, and all the conveniences of life. These places, which had hitherto been so well cultivated by a numerous and flourishing people, were now totally disregarded. Very soon they exhibited only a deplorable picture of a horrid desert; and this wildness must have been more melancholy and hideous than the dreary aspect of the earth before the origin of societies. The traveller, who was led by accident or curiosity into these desolate plains, could not forbear abhorring the barbarous and bloody authors of these devastations, while he reflected that it was not owing even to the cruel illusions of glory and to the fanaticism of conquest, but to the stupid and abject desire of gold, that they had sacrificed so much more real treasure, and so numerous a population.

This insatiable thirst of gold, which neither tended to subsistence, safety, nor policy, was the only motive for establishing new settlements, some of which have been kept up, while several have decayed, and others have been formed in their stead. The fate of them all has corresponded with the discovery, progress, or declension, of the mines to which they were subordinate.

Fewer errors have been committed in the means of procuring provisions. The natives had hitherto lived hardly on any thing else but maize, fruits, and pulse, for which they had used no other seasoning except salt and pimento. Their liquors, which were made from different roots, were more diversified: of these the chicha was the most usual; which is made from maize soaked in water, and taken out of the vessel when it begins to sprout. It is dried in the sun, then parched a little, and at last ground. The flour, after it has been well kneaded, is put with water into large pitchers. The fermentation may be expected in two or three days, and must not continue longer. The great inconvenience of this drink, which, when used immoderately, infallibly intoxicates, is, that it will not keep more than eight days without turning sour. Its taste is nearly that of the most indifferent kind of cyder. It is a refreshing, nourishing, and aperitive liquor. The Indians, who are never troubled with suppressions of urine, are said to owe that advantage to the use of this drink.

The conquerors were not satisfied either with the liquors or with the food of the people they had subdued. They imported vines from the Old World, which soon multiplied sufficiently in the sands of the coasts at Ica, Pisco, Nasca, Moquegua, and Truxillo, to furnish the colony with the wine and brandy it wanted. Olives succeeded still better; and yielded a great abundance of oil, which was much superior to that of the mother-country. Other fruits were transplanted with the same success. Sugar succeeds so well, that none of any other growth can be compared to that which is cultivated in these parts, where it never rains. In the inland country wheat and barley were sown; and at length all the European quadrupeds were found grazing at the foot of the mountains.

This was a considerable step; but there still remained much more to be done. After they had provided for a better and a greater choice of subsistence, the next care of the Spaniards was to have a dress more commodious and more agreeable than that of the Peruvians. These were, however, better clothed than any other
Ame-

Peru.

43
Manner of
living of the
natives.

Peru. American nation. They owed this superiority to the advantage which they alone possessed, of having the LAMA and PACOS, domestic animals which served them for this use. See CAMELUS.

After the conquest, all the Indians were obliged to wear cloths. As the oppression under which they groaned did not allow them to exercise their former industry, they contented themselves with the coarser cloths of Europe, for which they were made to pay an exorbitant price. When the gold and silver which had escaped the rapacity of the conquerors were exhausted, they thought of re-establishing their national manufactures. These were some time after prohibited, on account of the deficiency which they occasioned in the exports of the mother-country. The impossibility which the Peruvians found of purchasing foreign stuffs and paying their taxes, occasioned permission to be given at the end of ten years for their re-establishment. They have not been discontinued since that time, and have been brought to as great a degree of perfection as it was possible they could be under a continual tyranny.

44
Manufac-
tures, &c.

With the wool of the vicuna, a species of wild paco, they make, at Cuzco and in its territory, stockings, handkerchiefs, and scarfs. These manufactures would have been multiplied, if the spirit of destruction had not fallen on animals as well as on men. The same wool, mixed with that of the sheep imported thither from Europe, which hath exceedingly degenerated, serves for carpets, and makes also tolerably fine cloth. Fleeces of inferior quality are employed in serges, druggets, and in all kinds of coarse stuffs.

The manufactures subservient to luxury are established at Arequipa, Cuzco, and Lima. In these three towns is made a prodigious number of gold toys and plate, for the use of private persons, and also for the churches. All these manufactures are but coarsely wrought, and mixed with a great deal of copper. We seldom discover more taste in their gold and silver laces and embroideries which their manufactures also produce. This is not altogether the case in regard to their lace, which, when mixed with that of Europe, looks very beautiful. This last manufacture is commonly in the hands of the nuns, who employ in it the Peruvian girls, and the young Mestees of the towns, who for the most part before marriage pass some years in the convent.

Other hands are employed in painting and gilding leather for rooms, in making with wood and ivory pieces of inlaid work and sculpture, and in drawing figures on the marble that is found at Cucuca, or on linen imported from Europe. These different works, which are almost all manufactured at Cuzco, serve for ornaments for houses, palaces, and temples: the drawing of them is not bad, but the colours are neither exact nor permanent. If the Indians, who invent nothing, but are excellent imitators, had able masters and excellent models, they would at least make good copyists. At the close of the last century, some works of a Peruvian painter, named *Michael de St Jacques*, were brought to Rome; and the connoisseurs discovered marks of genius in them.

45
Of the
mines of
gold and sil-
ver.

Though the Peruvians were unacquainted with coin, they knew the use of gold and silver; for they employed them in different kinds of ornaments. Indepen-

dent of what the torrents and accident procured them of these metals, some mines had been opened of little depth. The Spaniards have not transmitted to us the manner in which these rich productions were drawn from the bosom of the earth. Their pride, which has deprived us of so much useful knowledge, undoubtedly made them think, that, in the inventions of a people whom they called *barbarous*, there was nothing that was worthy to be recorded.

The difference as to the manner in which the Peruvians worked their mines, did not extend to the mines themselves. The conquerors opened them on all sides. At first the gold mines tempted the avarice of the greater number. Fatal experience discouraged those whom passion had not blinded. They clearly saw, that, for some enormous fortunes raised in this manner, great numbers, who had only moderate fortunes, were totally ruined. These mines sunk into such discredit, that, in order to prevent them from being abandoned, the government was obliged to take the 20th part of their produce, instead of the fifth which it at first received.

The mines of silver were more common, more equal, and richer. They even produced silver of a singular species, rarely found elsewhere. Towards the sea-coast, great lumps of this metal are found in the sands.

There are a great number of other mines which are infinitely more important, and are found in the rocks and on the mountains. Several of them gave false hopes. Such, in particular, was that of Ucutayta, discovered in 1713. This was only an incrustation of almost massive silver, which at first yielded several millions, but was soon exhausted.

Others which were deeper, have been alike deserted. Their produce, though equal to what it was originally, was not sufficient to support the expence of working them, which augmented every day. The mines of Quito, Cuzco, and Arequipa, have experienced that revolution which awaits many of the rest.

There are greater numbers of very rich mines which the waters have invaded. The disposition of the ground, which from the summit of the Cordeleras goes continually shelving to the South Sea, must necessarily render these events more common at Peru than in other places. This inconvenience, which with greater care and skill might often have been prevented or diminished, has been in some instances remedied.

Joseph Salcedo, about the year 1660, had discovered, not far from the town of Puna, the mine of Layacota. It was so rich, that they often cut the silver with a chisel. Prosperity had so elevated the mind of the proprietor, that he permitted all the Spaniards who came to seek their fortune in this part of the New World, to work some days on their own account, without weighing or taking any account of the presents he made them. This generosity drew around him an infinite number of people, whose avidity made them quarrel with each other, and the love of money made them take up arms and fall upon one another; and their benefactor, who had neglected no expedient to prevent and extinguish their languishing contentions, was hangd as being the author of them. Whilst he was in prison, the water got possession of his mine. Superstition soon made it imagined that this was a punishment for the horrid act they had perpetrated against him. This

Peru.

idea of divine vengeance was revered for a long time; but at last, in 1740, Diego de Bacna associated with other opulent people, to avert the springs which had deluged so much treasure. The labours which this difficult undertaking required, were not finished till 1754. The mine yields as much now as it did at first. But mines still richer than this have been discovered. Such, for example, is that of Potosí, which was found in the same country where the Incas worked that of Porco.

An Indian, named *Hualpa*, in 1545, pursuing some deer, in order to climb certain steep rocks laid hold of a bush, the roots of which loosened from the earth, and brought to view an ingot of silver. The Indian had recourse to it for his own use; and never failed to return to his treasure every time that his wants or his desires solicited him to it. The change that had happened in his fortune was remarked by one of his countrymen, and he discovered to him the secret. The two friends could not keep their counsel and enjoy their good fortune. They quarrelled; on which the indifferent confidant discovered the whole to his master, Villaroel, a Spaniard who was settled in the neighbourhood. Upon this the mine became known, and was worked; and a great number of them were found in its vicinity; the principal of which are in the northern part of the mountain, and their direction is from north to south. The most intelligent people of Peru have observed, that this is in general the direction of the richest mines.

The fame of what was passing at Potosí soon spread abroad; and there was quickly built at the foot of the mountain, a town consisting of 60,000 Indians, and 10,000 Spaniards. The sterility of the soil did not prevent its being immediately peopled. Corn, fruit, flocks, American stuffs, European luxuries, arrived there from every quarter. Industry, which every where follows the current of money, could not search for it with so much success as at its source. It evidently appeared that in 1738 these mines produced annually near 978,000*l.* without reckoning the silver which was not registered, and what had been carried off by fraud. From that time the produce has been so much diminished, that no more than one-eighth part of the coin which was formerly struck is now made.

The mines of Potosí, and all the mines of South America, in purifying their gold and silver, use mercury, with which they are supplied from Guanua Velica. The common opinion is, that this mine was discovered in 1564. The trade of mercury was then still free; it became an exclusive trade in 1571. At this period all the mines of mercury were shut; and that of Guanua Velica alone was worked, the property of which the king reserved to himself. It is not found to diminish. This mine is dug in a prodigiously large mountain, 60 leagues from Lima. In its profound abysses are seen streets, squares, and a chapel, where the mysteries of religion on all festivals are celebrated. Millions of flambeaux are continually kept to enlighten it.

Private people at their own expence work the mine of Guanua Velica. They are obliged to deliver to government, at a stipulated price, all the mercury they extract from it. As soon as they have procured the quantity which the demands of one year require, the work is suspended. Part of the mercury is sold on

the spot, and the rest is sent to the royal magazines throughout all Peru; from whence it is delivered out at the same price it is sold for in Mexico. This arrangement, which has occasioned many of the mines to drop, and prevented others from being opened, is inexcusable in the Spanish system. The court of Madrid, in this respect, merits the same reproaches as a ministry in other countries would incur, that would be blind enough to lay a duty on the implements of agriculture.

The mine of Guanua Velica generally affects those who work in it with convulsions: this and the other mines, which are not less unhealthy, are all worked by the Peruvians. These unfortunate victims of an insatiable avarice are crowded all together and plunged naked into these abysses, the greatest part of which are deep, and all excessively cold. Tyranny has invented this refinement in cruelty, to render it impossible for any thing to escape its relentless vigilance. If there are any wretches who long survive such barbarity, it is the use of cocoa that preserves them.

PERUGIA, a town of Italy, in the pope's territories, and capital of Perugia. It is an ancient, handsome, populous, and large city, with a strong citadel, an university, and a bishop's see. The churches, and many other buildings as well public as private, are very handsome. It is seated on a hill, in E. Long. 12. 26. N. Lat. 43. 6.

PERUGINO, a province of Italy, in the territory of the church, bounded on the west by Tuscany, on the south by Orvietano, on the west by the duchies of Spoleto and Urbino, and on the north by the county of Citra Castellana. It is one of the smallest provinces in the territory of the Church. The air is very pure, and the soil fertile in corn and good wine; besides, the lake Perugia supplies them with plenty of fish. The capital town is Perugia. The lake is eight miles from the city, and is almost round, being about five miles in diameter; in it there are three islands. This province is about 25 miles in length, and near as much in breadth.

PERUVIAN BARK. See CINCHONA.

PESARO, a town of Italy, in the territory of the pope, and duchy of Urbino, with a bishop's see. It is a large place, whose streets are paved with bricks. The castle is very well fortified; the harbour excellent, and the cathedral church magnificent. The environs are remarkable for producing good figs, of which they send large quantities to Venice. It is seated on an eminence at the mouth of the river Foglia, on the gulph of Venice. E. Long. 13. 0. N. Lat. 43. 56.

PESCARA, a very strong town in the kingdom of Naples, and in the Hither Abruzzo; seated at the mouth of a river of the same name, which falls into the Gulph of Venice. E. Long. 14. 20. N. Lat. 42. 22.

PESCHIERA, a small but strong town of Italy, in the Veronese, with a castle, and a strong fort; seated on the river Mincio, or Menzo, which proceeds from the lake Garda. E. Long. 10. 37. N. Lat. 45. 23.

PESSARY, in medicine, a solid substance composed of wool, lint, or linen, mixed with powder, oil, wax, &c. made round and long like a finger, in order to be introduced into the exterior neck of the matrix.

Peru
Pessary.

Pestilence || trix, for the cure of several uterine disorders.

Peter.

PESTILENCE, in medicine, the same with the

PLAGUE.

PETAL, in botany, one of the coloured leaves which compose the flower.

PETALISM, in antiquity, a kind of banishment at Syracuse, by writing the person's name on a leaf; whence the name.

PETARD, in the art of war. See GUNNERY, n^o 57. and Plate cxi.

PETAU (Denis), or *Dionysius PETAVIUS*, a French Jesuit of great erudition, born at Orleans in 1583. He entered into the society of Jesuits in 1605; and did no little honour to it by his learning, which he employed in defending the Catholic church, by criticising and abusing its adversaries. Joseph Scaliger was the person against whom he was the most inveterate; nor did he spare his friend Casaubon when he came in his way. Petavius excelled particularly in the dark science of chronology, the learned world in general being obliged to him for some exact and nice disquisitions on this subject. His chief work, which is in great repute to this day, he intitled; *Rationarum temporum*. It is an abridgement of universal history, from the earliest times to 1632, in chronological order, with references to proper authorities. It was improved, and several additions made to it, by Perizonius, and others after his death. He died in 1652.

PETECHIE, in medicine, a name given to those spots, whether red or of any other colour, which appear in malignant fevers.

PETCHÉLI, a province of Asia, in China, and the chief in the whole empire; bounded on the east by the sea, on the north by the great wall, on the west by Chanfi, and on the south by Chantong and Honan. It contains Peking, which is the principal city in the whole empire, and on which 140 towns depend, besides a vast number of villages. The air is temperate, unless when the wind blows from the north; and there is a rainy season in the latter end of July and the beginning of August, but it seldom rains any other time. The soil is fertile, and produces all sorts of corn; and there are plenty of cattle, pulse, and fruits. They have also mines of pit-coal, which is their only fuel. All the riches of China are brought into this province, particularly to Peking, where the emperor resides.

PETER, or *Epistles of St PETER*, two canonical books of the New Testament written by the apostle St Peter, and addressed to those Jewish converts who were scattered throughout Pontus and Galatia, not only upon the persecution raised at Jerusalem, but upon former dispersions of the Jews into those places. The first of these epistles is principally designed to comfort and confirm them under those fiery trials they were then subject to, and to direct them how to behave in the several states and relations both in the civil and Christian life. In the second epistle, the apostle prosecutes the same subject, to prevent their apostasy from the faith, and guard them against the corrupt principles of the Gnostics, and those who scoffed at the promise of Christ's coming.

PETER (St), one of the apostles, was born at Bethsaida in Galilee, and was named *Simon*; but Christ having called him to be an apostle, changed his name

into that of *Cephas*, which is the same with Peter: for as he was fishing on the lake of Genazereth with Andrew his brother, the Son of God ordered them to leave their nets and to follow him; and from that time they continued his disciples. He was a witness to our Lord's transfiguration on the mount. He was present at the last supper; and was in the garden when the soldiers came to seize Jesus, where, being transported with zeal, he drew his sword and cut off the high-priest's servant's ear. But he soon after denied his knowing his Lord; and persisted in it three times, till the cock-crowing reminded him of Jesus's having foretold this instance of his weakness; on which he shewed his repentance by his tears. St Peter was likewise a witness of Christ's resurrection and ascension, and of the descent of the Holy Ghost. He afterwards preached the gospel with great zeal, converted 3000 persons at his first sermon, and performed many surprising miracles in proof of his divine mission. Some time after, Herod Agrippa caused him to be put in prison at Jerusalem, whence he was delivered by an angel. Dr Pearson has proved, that this apostle was at Rome, where he met with Philo the Jew, with whom he contracted an intimate acquaintance. When Claudius banished the Jews, he returned to Jerusalem; and, some say, travelled thence into Africa, or, according to others, preached in Britain: that toward the latter end of Nero he returned to Rome, where he was crucified, and buried in the Vatican. Constantine the Great rebuilt and enlarged the Vatican in honour of St Peter, which at this day is one of the wonders of the world. He wrote two epistles, addressed to the converted Jews dispersed throughout Asia; but the other works attributed to St Peter are spurious.

PETER of Blois, a learned man of the 12th century, was born about the year 1120, at the city of Blois in France, from whence he derived his name. His parents being opulent, gave him a learned education. In his youth, when he studied in the university of Paris, he was excessively fond of poetry; and when he was a little further advanced in life, he became no less fond of rhetoric, to the study of which he applied with the greatest ardour. From Paris he removed to Bononia in Italy, to acquire the civil and canon law; in the knowledge of both which he very much excelled. He appears from his writings to have cultivated medicine, and several branches of the mathematics, with no little care and success. The study of theology was the chief delight and business of his life, in which he spent the greatest part of his time, and made the greatest progress. But unfortunately it was that scholastic theology, which consisted in vain attempts to prove and explain the many absurd opinions which then prevailed in the church, by the subtleties of Aristotelian logic. In attempting to explain in this manner the most absurd of all opinions that ever existed amongst mankind, he was the very first person who employed the famous word *transubstantiation*, which was soon after adopted by the church of Rome, and hath ever since made too great a noise. Being appointed preceptor to William II. king of Sicily in 1167, he obtained the custody of the privy seal; and, next to the archbishop of Palermo, the prime minister, had the greatest influence in all affairs. But his power was not of long duration: for the archbishop being banished in 1168,

our:

Peter.

our author soon after left the court of Sicily, and returned into France. He was not long, however, without a royal patron, being invited into England by Henry II. who employed him as his private secretary, made him archdeacon of Bath, and gave him some other benefices. When he had spent a few years at court, he conceived a disgust at that way of life, (of which he hath drawn a very unpleasing picture in one of his letters), and retired into the family of Richard archbishop of Canterbury, who had made him his chancellor about the year 1176. In this station he continued to the death of the archbishop in 1183, enjoying the highest degree of favour with that prelate, though he used much freedom in reproving him for his remissness in the government of the church. Our author remained in the same station in the family of archbishop Baldwin, who succeeded Richard, acting both as his secretary and chancellor. He was also sent by that prelate on an embassy to Rome in 1187, to plead his cause before Pope Urban III. in the famous controversy between him and the monks of Canterbury about the church of Hackington. After the departure of his friend and patron Baldwin for the Holy Land in 1190, our author was involved in various troubles in his old age, the causes of which are not distinctly known; and died about the end of the 12th century. He appears from his works, which may be justly reckoned among the most valuable monuments of the age in which he flourished, to have been a man of great integrity and sincere piety, as well as of a lively inventive genius and uncommon erudition. His printed works consist of 134 letters, which he collected together at the desire of Henry II.; of 65 sermons, delivered on various occasions; and of 17 tracts on different subjects.

PETER the Hermit. See CRUSADE.

PETER I. justly styled *Peter the Great*, czar, and afterwards emperor, of Russia, founder of the Russian empire; for though the country was well known, and of great antiquity, yet it had no extent of power, of political influence, or of general commerce in Europe, till his time. He was born in 1672; and was proclaimed czar when but ten years of age, in exclusion of John his elder brother, who, being of a sickly constitution, was at the same time very weak in his understanding. The princess Sophia, his half-sister, made an insurrection in favour of John; and to put an end to the civil war, it was at last agreed that the two brothers should jointly share the imperial dignity. Peter had been very ill brought up, not only through the general defects of the Russian education, but likewise through the arts of the princess Sophia, who surrounded him with every thing that might stifle his natural desire of knowledge, deprave his mind, and enervate it with pleasures. Notwithstanding this, his inclination for military exercises discovered itself in his tenderest years. He formed a company of 50 men, commanded by foreign officers, clothed and exercised after the German manner. He entered himself into the lowest post, that of a drummer; and never rose otherwise than as a soldier of fortune. Herein his design was to teach his nobility, that merit, not birth, was the only title to military employments. He reinforced his company with several others, till at last he had got together a considerable body of soldiers. As

Peter.

he then had no war on his hands, he exercised them in all sorts of mock-engagements, and by this means secured to himself a body of well-disciplined troops. The sight of a Dutch vessel, which he had met with on a lake belonging to one of his pleasure-houses, made such an impression on his mind, that he conceived the almost impracticable design of forming a navy. His first care was to get some Hollanders to build some small vessels at Moscow; and he passed two successive summers on board English or Dutch ships, which set out from Archangel, that he might instruct himself in every branch of naval affairs. In 1696 czar John died, and Peter was now sole master of the empire. In 1698, he sent an embassy to Holland; and went *incognito* in the retinue, and visited England as well as Holland, in order to inform himself fully in the art of ship-building. At Amsterdam he worked in the yard as a private ship carpenter, under the name of *Peter Michaeloff*; but he has been often heard to say, that if he had never gone to England, he had still remained ignorant of that art. In 1700 he had got together a body of standing forces, consisting of 30,000 foot, and now the vast project he had formed displayed itself in all its parts. He opened his dominions, which till then had been shut up, having first sent the chief nobility of his empire into foreign countries to improve themselves in knowledge and learning. He invited into Russia all the foreigners he could meet with, who were capable of instructing his subjects in any manner, and offered them great encouragement to settle in his dominions. This raised many discontents; and the despotic authority he exerted on that occasion was scarcely powerful enough to suppress them. In 1700, being strengthened by the alliance of Augustus king of Poland, he made war on Charles XII. king of Sweden. His first ill success did not deter him: for he used to say, I know that my armies must be overcome for a great while; but even this will at last teach them to conquer. He afterwards gained considerable advantages, and founded Petersburg in 1703. In 1709 he gained a complete victory over the Swedes at Pultowa. In 1712, he was inclosed by the Turks on the banks of the Pruth; and seemed inevitably lost, had not the Czarina Catherine bribed the grand vizier, and the czar's prudence completed his deliverance. In 1716, he made a tour through Germany and Holland, and visited the royal academy of sciences at Paris. It would be endless to enumerate all the various establishments for which the Russians are obliged to him: He formed an army according to the manner of the poliest and most experienced nations: he fitted out fleets in all the four seas which border upon Russia; he caused many strong fortresses to be raised after the best plans; and made convenient harbours: he introduced arts and sciences into his dominions, and freed religion from many superstitious abuses: he made laws, built cities, cut canals, &c.; was generous in rewarding, impartial in punishing; faithful, laborious, and humble; yet was not free from a certain roughness of temper natural to his nation. He had indeed cured himself of excess in drinking; but he has been branded with several other vices, particularly cruelty. He published the unfortunate history of his son prince Alexei; towards whom some blame his severity, while others think it no more than was necessary. He perfectly knew

Peterperence knew the honour due to persons of merit; and not only heaped honours upon them during their life, but gave them marks of esteem even after their death. He died of the frangury in 1725, and left the world with the magnanimity of a hero and the piety of a Christian.

PETER-PENCE, and ancient tax of a penny on each house paid to the pope.—It was called *Peter-pence*, because it was collected on the day of St Peter ad vincula, and sent to Rome; whence it was also called *Rome-foot* and *Rome-penny*.

PETERBOROUGH, a city of Northamptonshire, with a bishop's see, a market on Saturdays, and two fairs, on July 10. and October 2. for all sort of stock-wrought timber and cheefe. It is seated on the river Nen, over which there is a bridge that leads into Huntingdonshire, in marshy ground. It is not a large place, for it has but one parish-church besides the cathedral; but the market-place is spacious, and the streets are regular. It sends two members to parliament. The cathedral was formerly a monastery; and is a majestic structure, full of curious work, and has a large choir. W. Lon. 6. 15. N. lat. 52. 33.

PETERSBURG, a city of the province of Ingria in Russia, and capital of the whole empire, situated in E. Long. 30. 23. N. Lat. 54. 56. It was founded in the year 1703 by Czar Peter the Great, whose ambition it was to have a fleet on the Baltic; for which reason he determined to found a city which might become the centre of trade throughout all his dominions. The spot he pitched upon was a low, fenny, uncultivated island, formed by the branches of the river Nieva, before they fall into the gulph of Finland. In the summer this island was covered with mud; and in winter became a frozen pool, rendered almost inaccessible by dreary forests and deep morasses, the haunts of bears, wolves, and other savage animals. Having taken the fort of Nattenbourg, and the town of Neischanz, in the year 1703, this mighty conqueror assembled in Ingria above 300,000 men, Russians, Tartars, Cossacks, Livonians, and others, even from the most distant parts of his empire, and laid the foundation of the citadel and fortifications, which were finished in four months, almost in despite of nature. He was obliged to open ways through forests, drain bogs, raise dykes, and lay causeways, before he could pretend to found the new city. The workmen were ill provided with necessary tools and implements, such as spades, pick-axes, shovels, planks, and wheel-barrows: they were even obliged to fetch the earth from a great distance in the skirts of their garments, or in little bags made of old mats and rags sewed together. The had neither huts nor houses to shelter them from the severity of the weather: the country, which had been desolated by war, could not accommodate such a multitude with provisions; and the supplies by the lake Ladoga were often retarded by contrary winds. In consequence of these hardships, above 100,000 men are said to have perished: nevertheless the work proceeded with incredible vigour and expedition; while Peter, for the fecurity of his workmen, formed a great camp, in such a manner, that his infantry continued in Finland, and his cavalry were quartered in Ingria. Some Swedish cruizers being desiered in the neighbourhood, the Czar posted a body of troops in the isle

of Rutzary, by whom the Swedes were repulsed, and Petersburg the work met with no farther interruption. The buildings of the city kept pace with the fortrefs, which is the centre of the town, surrounded on all sides by the Nieva; and, in little more than a year, above 30,000 houses were erected. At present there may be about double that number in Petersburg, tho' many of them are pauntry and inconsiderable. In order to peopple this city, Peter invited hither merchants, artificers, mechanics, and seamen, from all the different countries of Europe: he demolished the town of Nieuſchantz, and brought hither not only the materials of the houses, but the inhabitants themselves. A thousand families were drawn from Moscow; he obliged his nobility to quit their palaces and their villas in and about Moscow, and take up their residence at Petersburg, in a much more cold and comfortable climate. Finally, resolving to remove hither the trade of Archangel, he issued an ordonnance, importing, That all such merchandise as had been conveyed to Archangel, in order to be sold to foreigners, should now be sent to Petersburg, where they should pay no more than the usual duties. These endeavours and regulations have rendered this one of the greatest and most flourishing cities in Europe. The Russian boyars and nobility have built magnificent palaces, and are now reconciled to their situation. At first many houses were built of timber; but these being subject to sudden conflagrations in spite of all the precautions that could be taken, the Czar, in the year 1714, issued an order, that all new houses should be walled with brick and covered with tiles. The fort is an irregular hexagon, with opposite bastions. This, together with all the rest of the fortifications, was in the beginning formed of earth only; but in the sequel they were faced with strong walls, and provided with casemates, which are bomb-proof. In the curtain of the fort, on the right-hand side, is a noble dispensary, well supplied with excellent medicines, and enriched with a great number of porcelain vases from China and Japan. From one of gates of the fort a draw-bridge is thrown over an arm of the river, in which the Czar's galleys and other small vessels are sheltered in the winter. The most remarkable building within the fort is the cathedral, built by the direction of an Italian architect. Petersburg is partly built on little islands, some of which are connected by draw-bridges; and partly on the continent. In the highest part, on the bank of the Nieva, the Czar fixed his habitation, or ordinary residence, built of free-stone, and situated so as to command a prospect of the greater part of the city. Here likewise is a royal foundery; together with the superb houses of many noblemen. The marshy ground on which the city is built, being found extremely slippery, dirty, and incommodious, the Czar ordered every inhabitant to pave a certain space before his own door. In the year 1716, Peter, taking a fancy to the island Wasil-Otkono, which he had given as a present to prince Menzikoff, refused the grant, and ordered the city to be extended into this quarter. He even obliged the boyars, or nobles, to build stone houses on this spot, though they were already in possession of others on the side of Ingria: accordingly this is now the most magnificent part of the city. On the other side of a branch of the Nieva

Rands

Petersburg. lands the Czar's country or summer palace, provided with a fine garden and orangery. On the bank of the same river is the slaboda, or suburb, in which the Germans generally choose their habitation. Petersburg is very much subject to dangerous inundations. In the year 1715, all the bastions and draw-bridges were either overwhelmed, or carried away. The breadth, depth, and rapidity of the Nieva, have rendered it extremely difficult, if not impracticable, to join the islands and the continent by bridges. Besides, Peter was averse to this expedient for another reason: resolved to accustom his subjects to navigation, he not only rejected the project of a bridge; but also ordered, that no boat should pass between the islands and continent, except by the help of sails only. In consequence of this strange regulation, many lives were lost: but at length he gained his point; and by habituating his sluggish Muscovites to the dangers of the sea, in a little time produced a breed of hardy sailors. The adjacent country is so barren, that the town must be supplied with provisions from a great distance; consequently they are extremely dear. Here are woods in plenty, consisting of pine, fir, alder, birch, poplar, and elm; but the oak and the beech are generally brought from Casan. In winter the weather is extremely cold, and hot in the summer. In June the length of the night does not exceed three hours, during which the natives enjoy a continued twilight: but in December the sun is not visible more than three hours above the horizon.

The Czar Peter, who was indefatigable in his endeavours to improve and civilize his subjects, neglected nothing which he thought could contribute to these purposes. He condescended even to institute and regulate assemblies at Petersburg: these were opened at five in the afternoon, and the house was shut at ten: between these hours the fashionable people of both sexes met without ceremony, danced, conversed, or played either at cards or at chefs, this last being a favourite diversion among the Russians. There was likewise an apartment set apart for drinking brandy and smoking tobacco. Plays and operas were likewise introduced for the same purposes; but as Peter had little relish, and less taste, for those entertainments, they were performed in a very awkward manner in his life-time: however, since his death, these performances have been brought to a greater degree of art and decorum.

This great northern legislator established, in the neighbourhood of Petersburg, manufactures of linen, paper, saltpetre, sulphur, gun-powder, and bricks, together with water-mills for sawing timber. He instituted a marine academy, and obliged every considerable family in Russia to send at least one son or kinsman, between the ages of ten and eighteen, to this seminary, where he was instructed in navigation, learned the languages, was taught to perform his exercises, and to live under the severest discipline. To crown his other plans of reformation, he granted letters-patent for founding an academy, upon a very liberal endowment; and though he did not live to execute this scheme, his empress, who survived him, brought it to perfection. It was modelled on the plans of the royal society in London, and the academy of France. Mr Bullinger opened it in the year 1726,

with an eloquent speech on the design and utility of an academy of sciences; and the professors, who have always distinguished themselves by their merit and erudition, published an annual collection of their transactions: a task the more easy, as they have the benefit of printing presses, well managed, at Petersburg.

PETERSFIELD, a handsome town of Hampshire in England, sending two members to parliament. It is seated in W. Long. 1. 5. N. Lat. 51. 5.

PETERWARADIN, a fortified town in Sclavonia, and one of the strongest frontier places the house of Austria has against the Turks, seated on the Danube between the Drave and the Save. E. Long. 20. 0. N. Lat. 45. 20.

PETIOLE, in botany, the slender stalks that support the leaves of a plant.

PETIT, or PETITE, a French word signifying little or small.

PETITE Guerre, denotes the operations of detached parties, and the war of posts. See WAR, Part III.

PETIT Sergeanty. See SERGEANTY.

PETIT Treason. See TREASON.

PETIT (John Lewis), an eminent surgeon, born at Paris in 1674. He had so early an inclination to surgery, that Mr Littre, a celebrated anatomist, being in his father's house, he regularly attended that gentleman's lectures, from his being seven years of age. He was received master in surgery in the year 1700; and acquired such reputation in the practice of that art, that in 1726 the king of Poland sent for him to his court, and in 1734 the king of Spain prevailed on him to go into that kingdom. He restored the health of those princes; and they endeavoured to detain him by offering him great advantages, but he chose rather to return to France. He was received into the academy of sciences in 1715; became director of the royal academy of surgery; made several important discoveries; and invented new instruments for the improvement of surgery. He died at Paris in 1750. He wrote an excellent Treatise on the Diseases of the Bones, the best edition of which is that of 1723; and many learned Dissertations in the Memoirs of the Academy of Sciences, and in the first volume of the Memoirs of Surgery.

PETITIO PRINCIPII, in logic, the taking a thing for true, and drawing conclusions from it as such, when it is really false, or at least wants to be proved before any inferences can be drawn from it.

PETITION, a supplication made by an inferior to a superior, and especially to one having jurisdiction. It is used for that remedy which the subject hath to help a wrong done by the king, who hath a prerogative not to be sued by writ: In which sense it is either general, That the king do him right; whereupon follows a general indorsement upon the same, *Let right be done the party*: Or it is special, when the conclusion and indorsement are special, for this or that to be done, &c.

By statute, the soliciting, labouring, or procuring the putting the hands or consent of above twenty persons to any petition to the king or either house of parliament, for alterations in church or state, unless by assent of three or more justices of peace of the county, or a majority of the grand jury at the assizes or sessions, &c. and repairing to the king or parliament

Petersfield
Petition.

Petitory,
Petitot.

ment to deliver such petition with above the number of ten persons, is subject to a fine of 100 l. and three months imprisonment, being proved by two witnesses, within six months, in the court of B. R. or at the assizes, &c. And if what is required by this statute be observed, care must be taken that petitions to the king contain nothing which may be interpreted to reflect on the administration; for if they do, it may come under the denomination of a libel: and it is remarkable, that the petition of the city of London for the fitting of a parliament was deemed libellous, because it suggested that the king's dissolving a late parliament was an obstruction of justice; also the petition of the seven bishops, sent to the Tower by James II. was called a libel, &c. To subscribe a petition to the king, to frighten him into a change of his measures, intimating, that if it be denied many thousands of his subjects will be discontented, &c. is included among the contempts against the king's person and government; tending to weaken the same, and is punishable by fine and imprisonment.

PETITORY ACTION, in Scots law. See LAW, N° clxxxiii. 18. 20.

PETITOT (John), a curious painter in enamel, born at Geneva in 1607. He studied the art with such application, that he arrived to a degree of perfection that may almost be accounted inimitable. He was wonderfully patient in finishing his works, though he had the address to conceal his labour: however, he only painted the heads and hands of the figures; the hair, grounds, and drapery, being executed by Bordier his brother-in-law. These two artists had the credit of associating and labouring together for fifty years, without the least misunderstanding happening between them. It is asserted by an ingenious French writer, that Petitot and Bordier derived the knowledge of the most curious and durable colours proper for enamelling, from Sir Theodore Mayerne at London, who recommended Petitot to Charles I. He had the honour to paint the portraits of that monarch and the whole royal family, and continued in England until Charles's unhappy end: he then went to Paris, where he was highly favoured by Lewis XIV. and acquired an ample fortune. Being a Protestant, the revocation of the edict of Nantz obliged him to retire to Geneva; but settling soon after at Veray in the canton of Bern, he passed the remainder of his life in ease and affluence. He died in 1691; and had 17 children: of whom one took to painting, and settled at London, where he gained good reputation; but was much inferior to his father.

Petitot may be called the inventor of painting portraits in enamel. Though his friend Bordier made several attempts before him, and Sir Theodore Mayerne had facilitated the means of employing the most beautiful colours; yet Petitot completed the works, which under his hand acquired a softness and liveliness of colouring that will never change, and will ever render his works valuable. He made use of gold and silver plates, and seldom enamelled on copper. When he first came in vogue, his price was 20 louis's a head, which he soon raised to 40. It was his custom to take a painter with him, who painted the picture in oil; after which Petitot sketched out his work, which he always finished after the life. When he painted

the king of France, he took those pictures for his copies that most resembled him; and the king afterwards gave him a sitting or two to finish his work.

PETRA, (Cæsar, Lucian), a town of Greece on the coast of Illyricum, near Dyrrhachium, and not far from the mouth of the river Panyassus.—Another PETRA, (Livy): a town of Mædia, a district of Thrace, lying towards Macedonia; but in what part of Macedonia, he does not say.

PETRA, (Ptolemy), *Petra* (Silius Italicus), *Petrina* (Italicus), in both which last *urbs* is understood; an inland town of Sicily, to the south-west of Engyum. Now *Petraglia*, (Cluverius).

PETRA *Jektsad*, (2 Kings xiv.), a town of the Amalekites; near the Adscensus Scorpionis (Judg. i.) and the Valley of Salt in the south of Judea: afterwards in the possession of the Edomites, after destroying the Amalekites.

PETRA *Rekem*, or *Rokem*, so called from Rekem king of the Midianites, slain by the Israelites, (Num. xxxi.) Formerly called *Arcs*, now *Petra*; the capital of Arabia *Petræa*, (Josephus). Ptolemy places it in Long. 66. 45. from the Fortunate Islands, and Lat. 30. 20. It declines therefore 80 miles to the south of the parallel of Jerusalem, and 36 miles, more or less, from its meridian to the east. Josephus says, that the mountain on which Aaron died stood near Petra; which Strabo calls the capital of the Nabatæi; at the distance of three or four days journey from Jericho. This Petra seems to be the Sela of Isaiah xvi. 1. and xlii. 11. the Hebrew name of *Petra* "a rock:" Though some imagine Petra to be no older than the time of the Macedonians.

PETRARCH (Francis), a celebrated Italian poet, was born at Arezzo in 1304, and was the son of Petrarcho di Parenzo. He studied grammar, rhetoric, and philosophy, for four years at Carpentras; from whence he went to Montpellier, where he studied the law under John Andreas and Cino di Pistoia, and probably from the latter received a taste for Italian poetry. As Petrarch only studied the law out of complaisance to his father, who on his visiting him at Bologna had thrown into the fire all the Latin poets and orators except Virgil and Cicero, he, at 22 years of age, hearing that his father and mother were dead of the plague at Avignon, returned to that city to settle his domestic affairs, and purchased a country-house in a very solitary but agreeable situation, called *Vaucluse*; where he first knew the beautiful Laura, with whom he fell in love, and whom he has immortalised in his poems. He at length travelled into France, the Netherlands, and Germany; and at his return to Avignon entered into the service of Pope John XXII. who employed him in several important affairs. Petrarch was in hopes of being raised to some considerable posts: but being disappointed, he applied himself entirely to poetry; in which he met with such applause, that in one and the same day he received letters from Rome and the chancellor of the university of Paris, by which they invited him to receive the poetic crown. By the advice of his friends, he preferred Rome to Paris, and received that crown from the senate and people on the 8th of April 1341. His love of solitude at length induced him to return to Vaucluse; but, after the death of the beau-

Petra,
Petrarch.

Petre
Petrification

tiful Laura, Provence became insupportable to him, and he returned to Italy in 1352; when, being at Milan, Galeas Viceconti made him counsellor of state. Petrarch spent almost all the rest of his life in travelling to and from the different cities in Italy. He was archdeacon of Parma, and canon of Padua; but never received the order of priesthood. All the princes and great men of his time gave him public marks of their esteem; and while he lived at Arcqua, three miles from Padua, the Florentines deputed Boccace to go to him with letters, by which they invited him to Florence, and informed him, that they restored to him all the estate of which his father and mother had been deprived during the dissensions between the Guelphs and Ghibelins. He died a few years after at Arcqua, in 1374. He wrote many works that have rendered his memory immortal; these have been printed in four volumes folio. His life has been written by several authors.

PETRE, or SALT-PETRE, in chemistry. See NITRE.

PETREA, in botany, a genus of the angiospermia order belonging to the didynamia class of plants. There is only one species, a native of New Spain. It rises to the height of 15 or 16 feet, with a woody stalk covered with grey bark, sending out several long branches. These have a whiter bark than the stem, and are garnished with leaves at each joint, which, on the lower part of the branches, are placed by threes round them; but, higher up, they are rough, and have a rough surface. The flowers are produced at the ends of the branches, in loose bunches nine or ten inches long, each flower standing on a slender flower-stalk about an inch long: the empalement of the flower is composed of five narrow obtuse leaves about an inch long, which are of a fine blue colour, and much more conspicuous than the petals, which are white, and not more than half the length of the empalement. The plant is propagated by seeds procured from the places where they are natives, and of which very few are good; for though Dr Houston, the discoverer of the plant, sent parcels of seeds to several persons in England, only two plants were produced from the whole. The seeds must be sown in a good hot-bed; and when the plants come up, they should all be planted in a separate small pot filled with light loamy earth, and plunged into a hot-bed of tanners bark, where they should afterwards constantly remain.

PETREL, in ornithology. See PROCELLARIA.

PETRIDIA, in natural history, a genus of scrupi, of a plain, uniform texture; of no great variety of colours, and emulating the external form of pebbles.

PETRIFICATION, in physiology, denotes the conversion of wood, bones, and other substances, into stone.

The fossil bodies found petrified are principally either of vegetable or animal origin; and are more or less altered from their original state, according to the different substances they have lain buried among in the earth; some of them having suffered very little change, and others being so highly impregnated with crystalline, sparry, pyritical, or other extraneous matter, as to appear mere masses of stone or lumps of the matter of the common pyrites; but they are generally of the external dimensions, and retain more or less of

the internal figure, of the bodies into the pores of which this matter has made its way.

The animal-substances thus found petrified are seashells; the teeth, bony palates, and bones, of fish; the bones of land-animals, &c. These are found variously altered, by the insinuation of stony and mineral matter into their pores; and the substance of some of them is now wholly gone, there being only stony, sparry, or other mineral matter remaining in the shape and form.

As to the manner in which petrification is accomplished, we know very little. It has been thought by many philosophers, that this was one of the rare processes of nature; and accordingly such places as afforded a view of it, have been looked upon as great curiosities. However, it is now discovered, that petrification is exceedingly common; and that every kind of water carries in it some earthy particles, which being precipitated from it, become stone of a greater or lesser degree of hardness; and this quality is most remarkable in those waters which are much impregnated with selenitic matter. Of late, it has also been found

by some observations on a petrification in East Lothian in Scotland, that iron contributes greatly to the process; and this it may do by its precipitation of any aluminous earth which happens to be dissolved in the water by means of an acid; for iron has the property of precipitating this earth, though it cannot precipitate the calcareous kind. The calcareous kinds of earth, however, by being soluble in water without any acid, must contribute very much to the process of petrification, as they are capable of a great degree of hardness by means only of being joined with fixed air, on which depends the solidity of our common cement or mortar used in building houses. See the articles CEMENT and MORTAR. See also SAND, SELENITES, ROCK, STONE, and WATER.

PETROBRUSSIANS, in church-history, a religious sect which arose in France and the Netherlands about the year 1126, so called from their leader Peter Bruys. They denied, that children, before the use of reason, can be justified by baptism. They also condemned all places of public worship, crosses, &c. and are said to have rejected the sacrament of the eucharist, and prayers for the dead.

PETROLEUM, or ROCK-OIL, is an extremely subtle and penetrating fluid, and is much the thinnest of all the native bitumens. It is very light and very pellucid; but though equally bright and clear under all circumstances, it is liable to a very great variety in its colour. It is naturally almost colourless, and in its appearance greatly resembles the most pure oil of turpentine: this is called *white petroleum*, though it has no more colour than water. It is sometimes tinged of a brownish, reddish, yellowish, or faint greenish colour; but its most frequent colour is a mixture of the reddish and blackish, in such a degree that it looks black when viewed behind the light, but purple when placed between the eye and a candle or window. It is of a pungent and acrid taste; and of a very strong and penetrating smell, which very much approaches to that of the distilled oil of amber. The white is most esteemed. It is so very inflammable, that while it floats on the surface of the water, as it does in many parts of Italy, it takes fire at the approach of a candle.

Petroleum is found in rivers, in wells, and trickling down

Petrobrus-
sians,
Petroleum.

Vide Phil.
Trans. v. 69.
part. i. p. 35.

Petroleum. down the sides of hills along with little streams of water. It short, it is the most frequent of all the liquid bitumens, and is perhaps the most valuable of them all in medicine. It is to be chosen the purest, lightest, and most pellucid that can be had, such as is of the most penetrating smell and is most inflammable.

It is principally used externally, in paralytic cases, and in pains of the limbs.

Mr Bouldoc made several experiments with the white petroleum of Modena, an account of which he gave to the Paris academy.

It easily took fire on being brought near a candle, and that without immediately touching the flame; and when heated in any vessel, it will attract the flame of a candle, though placed at a great height above the vessel, and the vapour it sends up taking fire, the flame will be communicated to the vessel of heated liquor, and the whole will be consumed. It burns in the water; and when mixed with any liquor swims on the surface of it, even of the highest rectified spirit of wine, which is $\frac{1}{4}$ heavier than pure petroleum. It readily mixes with all the essential oils of vegetables, as oil of lavender, turpentine, and the rest, and seems very much of their nature: nor is this very strange, since the alliance between these bodies is probably nearer than is imagined, as the essential oils of vegetables may have been originally mineral ones, and drawn up out of the earth into the vessels of the plants.

Petroleum, when shaken, yields a few bubbles; but they sooner subside than in almost any other liquor, and the liquor resumes its clear state again almost immediately. This seems owing to the air in this fluid being very equally distributed to all its parts, and the liquor being composed of particles very evenly and nicely arranged.

This extensibility of the oil is also amazing. A drop of it will spread over several feet of water, and in this condition it gives a great variety of colours; that is, the several parts of which this thin film is composed, act as so many prisms. The most severe frost never congeals petroleum into ice; and paper wetted with it becomes transparent, as when wetted with oil; but it does not continue so, the paper becoming opaque again in a few minutes, as the oil dries away.

Spirit of wine, which is the great dissolvent of sulphur, has no effect upon petroleum, not even with ever so long a digestion. It will not take fire with the dephlegmated acid spirits; as oil of cloves, and other of the vegetable essential oils do: and in distillation, either by balneum mariæ, or in sand, it will neither yield phlegm nor acid spirit; but the oil itself rises in its own form, leaving in the retort only a little matter, thick as honey, and of a brownish colour.

Alonso Barba, in his book of metals, gives a very melancholy instance of the power of petroleum of taking fire at a distance: he tells us, that a certain well, yielding petroleum on the surface of its water, being to be repaired, the workman took down into the well with him a lantern and a candle in it; there were some holes in the lantern, through which the petroleum at a considerable distance sucked out the flame of the candle, and, taking fire, burst up with the noise of a cannon, and tore the man to pieces.

The people of mount Ciaro, in Italy, have some years since found out a much easier way of finding petro-

leum than that which they formerly had been used to. This mountain abounds with a sort of greyish salt, which lies in large horizontal beds, mingled with strata of clay, and large quantities of a spar of that kind called by the Germans *feleniter*; which is the common sort, that ferments with acids, and readily dissolves in them, and calcines in a small fire. They pierce these strata in a perpendicular direction till they find water; and the petroleum which had been dispersed among the cracks of those strata, is then washed out by the water, and brought from all the neighbouring places to the hole or well which they have dug, on the surface of the water of which it swims after eight or ten days. When there is enough of it got together, they lade it from the top of the water with brals bafons, and it is then easily separated from what little water is taken up with it. These wells or holes continue to furnish the oil in different quantities for a considerable time; and when they will yield no more, they pierce the strata in some other place.

Petroleum is never used among us; but the French give it internally in hysterical complaints, and to their children for worms: some also give it from 10 to 15 drops in wine, for suppressions of the menses. This, however, is rather the practice of the common people than of the faculty.

PETROMYZON, the **LAMPREY**, a genus of fishes belonging to the class of amphibia nantes. It has seven spiracula at the side of the neck, no gills, a fistula on the top of the head, and no breast or belly fins. There are three species, distinguished by peculiarities in their back-fins. There are three species.

1. The marinus, or sea-lamprey, is sometimes found so large as to weigh four or five pounds. The mouth is round, and placed rather obliquely below the end of the nose: the edges are jagged, which enables them to adhere the more strongly to the stones, as their custom is, and which they do so firmly as not to be drawn off without some difficulty. Mr Pennant mentions one weighing three pounds, which was taken out of the Elk, adhering to a stone of 12 pounds weight, suspended at its mouth, from which it was forced with no small pains. There are in the mouth 20 rows of small teeth, disposed in circular orders, and placed far within. The colour is dusky, irregularly marked with dirty yellow, which gives the fish a disagreeable look.

Lampreys are found at certain seasons of the year in several of our rivers, but the Severn is the most noted for them. They are sea-fish; but, like salmon, quit the salt waters, and ascend the latter end of the winter, or beginning of spring, and after a stay of a few months return again to the ocean, a very few excepted. The best season for them is in the months of March, April, and May; for they are more firm when just arrived out of the salt water than they are afterwards, being observed to be much wasted, and very flabby at the approach of hot weather. They are taken in nets along with salmon and shad, and sometimes in weels laid in the bottom of the river. It has been an old custom for the city of Gloucester, annually, to present his majesty with a lamprey pye, covered with a large railed crust. As the gift is made at Christmas, it is with great difficulty the corporation can procure any fresh lampreys at that time, though they give a guinea a-piece for them, so early

Petromy-
zon.

Petromy- in the season. They are reckoned a great delicacy, either when potted or stewed; but are a surfeiting food, as one of our monarchs fatally experienced, Henry I.'s death being occasioned by a too plentiful meal of these fish. It appears, that, notwithstanding this accident, they continued in high esteem; for Henry IV. granted protections to such ships as brought over lampreys for the table of his royal consort.

Petronius, Mr Pennant is of opinion, that the ancients were unacquainted with this fish; at least, he says, it is certain, that which Dr Arbuthnot and other learned men render the word *lamprey*, is a species unknown in our seas, being the *muræna* of Ovid, Pliny, and others, for which we want an English name. This fish, the *lupus* (our bass), and the *myxo* (a species of mullet), formed that pride of Roman banquets, the *tripatinam*, so called, according to Arbuthnot, from their being served up in a machine with three bottoms. The words *lampetra* and *petromyzon* are but of modern date, invented from the nature of the fish; the first *à lambendo petras*, the other from *petros* and *myxau*, because they are supposed to lick or suck the rocks.

2. The fluviatilis, or lesser lamprey, sometimes grows to the length of 10 inches. The mouth is formed like that of the preceding. On the upper part is a large bifurcated tooth: on each side are three rows of very minute ones: on the lower part are seven teeth, the exterior of which on one side is the largest. The irides are yellow. As in all the other species, between the eyes, on the top of the head, is a small orifice of great use to clear its mouth of the water that remains on adhering to the stones, for through that orifice it ejects the water in the same manner as cetaceous fish. On the lower part of the back is a narrow fin, beneath that rises another, which at the beginning is high and angular, then grows narrow, surrounds the tail, and ends near the anus. The colour of the back is brown or dusky, and sometimes mixed with blue; the whole under-side silvery. These are found in the Thames, Severn, and Dee, are potted with the larger kind, and are by some preferred to it, as being milder tasted. Vast quantities are taken about Mortlake, and sold to the Dutch for bait for their cod-fishery. Above 430,000 have been sold in a season at 40s. per 1000. Of late, about 100,000 have been sent to Harwich for the same purpose. It is said that the Dutch have the secret of preserving them till the turbot fishery.

3. The bronchialis, or lampren, is sometimes found of the length of eight inches, and about the thickness of a swan's quill; but they are generally much smaller. The body is marked with numbers of transverse lines, that pass cross the sides from the back to the bottom of the belly, which is divided from the mouth to the anus by a faint line. The back fin is not angular like that of the former, but of an equal breadth. The tail is lanceolated, and short at the end. They are frequent in the rivers near Oxford, particularly the Isis; but not peculiar to that county, being found in others of the English rivers, where, instead of concealing themselves under the stones, they lodge themselves in the mud, and never are observed to adhere to any thing like other lampreys.

PETRONIUS ARBITER (Titus), a great critic and polite writer of antiquity, the favourite of Nero, sup-

posed to be the same mentioned by Tacitus in the 16th book of his Annals. He was proconsul of Bithynia, and afterwards consul, and appeared capable of the greatest employments. He was, nevertheless, extremely voluptuous; for he spent the greatest part of the day in sleep, and the night in pleasure and business. He was one of Nero's principal confidants, and in a manner the superintendent of his pleasures; for that prince thought nothing agreeable or delightful but what was approved by Petronius. The great favour shewn him drew upon him the envy of Tigellinus, another of Nero's favourites, who accused him of being concerned in a conspiracy against the emperor; on which Petronius was seized, and being sentenced to die, he from time to time caused his veins to be opened and closed again, entertaining himself the while in discoursing on poetry with his friends. He afterwards sent to Nero a book sealed up with his own hand, in which he described the debaucheries of that prince under borrowed names, and died in the year 65 or 66. There are still extant a satire, and some other of his pieces, well written in Latin, but filled with indecencies; which occasioned Petronius's being called *Autor purissima impuritatis*. There was found in the last century a fragment of his works at Traou, in Dalmatia. It is a folio manuscript two fingers thick, in which is contained Trimalcio's supper; it made much noise among the learned, and occasioned many disputes for and against its authenticity.

PETROSA ossa, in anatomy, a name given to the fourth and fifth bones of the cranium, called also *ossa temporum*, and *ossa squamosa*; the substance whereof, as their first and last names express, is squamous and very hard.

PETTY (Sir William), son of Anthony Petty a clothier, was born at Rumsey, a little haven-town in Hampshire, in 1623; and while a boy took great delight in spending his time among the artificers there, whose trades he could work at when but twelve years of age. Then he went to the grammar-school there: at 15, he was master of the Latin, Greek, and French tongues, and of arithmetic and those parts of practical geometry and astronomy useful to navigation. Soon after, he went to Caen in Normandy, and Paris, where he studied anatomy, and read Vesalius with Mr Hobbes. Upon his return to England, he was preferred in the king's navy. In 1643, when the war between the king and parliament grew hot, he went into the Netherlands and France for three years; and having vigorously prosecuted his studies, especially in physic, at Utrecht, Leyden, Amsterdam, and Paris, he returned home to Rumsey. In 1647, he obtained a patent to teach the art of double-writing for seven years. In 1648, he published at London "Advice to Mr Samuel Hartlib, for the advancement of some particular parts of learning." At this time he adhered to the prevailing party of the kingdom; and went to Oxford, where he taught anatomy and chemistry, and was created a doctor of physic. In 1650, he was made professor of anatomy there; and soon after, a member of the college of physicians in London. The same year he became physician to the army in Ireland; where he continued till 1659, and acquired a great fortune. After the Restoration he was introduced to king Charles II. who knighted him in 1661.

In.

Petroſa,
Petty.

Petty
||
Pezron.

In 1662, he published "A treatise of taxes and contributions." Next year he was greatly applauded in Ireland for his invention of a double-bottomed ship. He died at London of a gangrene in the foot, occasioned by the swelling of the gout, in 1687. Besides the works above-mentioned, he wrote a vast many others.

PETTY, any thing little or diminutive, when compared with another.

PETTY-Bag, an office in chancery; the three clerks of which record the return of all inquisitions out of every county, and make all patents of comptrollers, gaugers, customs, &c.

PETTY-Fogger, a little tricking solicitor or attorney, without either skill or conscience.

PETTY, or *Petit*, Larceny. See LARCENY.

PETTY-Pateer, among confectioners, a sort of small pies, made of a rich crust filled with sweet-meats.

PETTY-Singles, among falconers, are the toes of a hawk.

PETTY-Tally, in the sea-language, a competent allowance of victuals, according to the number of the ship's company.

PETTY, or *Petit*, Treason. See TREASON.

PETUNSE, in natural history, one of the two substances whereof porcelain or china-ware is made. The petunse is a coarse kind of flint or pebble, the surface of which is not so smooth when broken as that of our common flint. See PORCELAIN.

PEUCEDANUM, or SULPHUR-WORT; a genus of the digynia order, belonging to the pentandria class of plants. There are three species; none of which have any remarkable properties excepting the officinale, or common hogs-fennel, growing naturally in the English salt-marshes. This rises to the height of two feet, with channelled stalks, which divide into two or three branches, each crowned with an umbel of yellow flowers, composed of several small circular umbels. The roots, when bruised, have a strong fetid scent like sulphur, and an acrid, bitterish, unctuous taste. Wounded in the spring, they yield a considerable quantity of yellow juice, which dries into a gummy resin, and retains the strong smell of the root. This should seem to be possessed of some medicinal virtues, but they have never been ascertained with any precision. The expressed juice was used by the ancients in lethargic disorders.

PEWIT, SEA-CROW, or *Mire-crow*, in ornithology. See LARUS.

PEWTER, a facitious metal used in making domestic utensils, as plates, dishes, &c.—The basis of the metal is tin; which is converted into pewter, by mixing at the rate of an hundred weight of tin with 15 pounds of lead and six pounds of brass.—Besides this composition, which makes the common pewter, there are other kinds, compounded of tin, regulus of antimony, bismuth, and copper, in several proportions.

PEZRON (Paul), a very learned and ingenious Frenchman, born at Hennebion in Britany in 1639, and admitted into the order of Cîteaux in 1660. He was a great antiquary, and was indefatigable in tracing the origin of the language of the Goths; the result of which was, that he was led to espouse a system of the world's being much more antient than modern chronologers have supposed. This he communicated

to the public in a treatise printed at Paris in 1687, 4to. intitled *The antiquity of Time, restored and defended against the Jews and modern chronologers*. This book of Pezron's was extremely admired for the ingenuity and learning in it; yet caused no small alarm among the religious, against whom he nevertheless defended his opinions. He went through several promotions, the last of which was the abbey of Charmoye, to which he was nominated by the king; and died in 1706.

PHÆACIA, one of the names of the island Corcyra, (Homer, Stephanus). *Phæaces* the people, (Ovid), noted for their indolence and luxury: hence Horace uses *Phæax* for a person indolent and sleek; and hence arose their inselence and pride, (Aristotle). The island was famous for producing large quantities of the finest flavoured apples, (Ovid, Juvenal, Propertius).

PHÆDRUS, an ancient Latin writer, who composed five books of fables, in Iambic verse. He was a Thracian; and was born, as there is reason to conclude, some years before Julius Cæsar made himself master of the Roman empire. How he came into the service of Augustus is not known; but his being called *Augustus's freedman* in the title of the book, shows that he had been that emperor's slave. The fables of Phædrus are valued for their wit and good sense, expressed in very pure and elegant language; and it is remarkable that they remained buried in libraries altogether unknown to the public, until they were discovered and published by Peter Pitheou, or Pitheus, a learned French gentleman, toward the close of the 16th century.

PHÆNOMENON, in philosophy, denotes any remarkable appearance, whether in the heavens or earth, and whether discovered by observation or experiment.

PHÆTON, in fabulous history, was the son of Apollo and of the nymph Clymene. He had a dispute with Epaphus, the son of Jupiter and Io; when the latter, upbraiding him, said, that he was not the son of Phœbus, but that his mother artfully made use of that pretence to cover her infamy. Phæton, fired at this reproach, flew to his mother, and by her advice carried his complaint to Apollo, who received him with great tenderness, and swore by Styx to grant whatever he requested, as a proof of his acknowledging him for his son. The youth boldly asked the direction of the chariot of the sun for one day. His father, grieved and surpris'd at this demand, used all his arguments to dissuade him from the rash attempt; but all was in vain, and, being by his oath reduced to submit to his obtrusiveness, entrusted him with the reins, after he had directed him how to use them. The young adventurer was however soon sensible of his madness. He was unable to guide the fiery steeds; and losing the reins, Jupiter, to prevent his consuming the heavens and earth, struck him with a thunder-bolt, and hurled him from his seat into the river Eridanus or Po. His sisters Phæthusa, Lamætia, and Phæbe, lamenting his loss upon its banks, were changed by the gods into black poplar trees; and Cynos, king of Liguria, also grieving at his fate, was transformed into a swan.

PHAGEDÆNA, in medicine, denotes a corroding ulcer.

PHAGEDENIC MEDICINES, those used to eat off prout

Phæacia
||
Phagedenic.

Phaena proud or fungous flesh; such as are all the caustics.
Phalaris.

PHALENA, the *MOTH*, in zoology, a genus of insects belonging to the order of lepidoptera. The feelers are fetaceous, and taper gradually towards the points; the wings are often bent backwards; and there are no less than 460 species.

All the creatures of this class are quiet by day, remaining fixed to the stalks or leaves of plants, except only some of the males, which are now and then found fluttering about in the woods in search of the females; but as soon as night approaches, they all fly about. This disposition is very remarkably implanted in their nature: for when kept shut up in boxes, they always remain quiet without changing place all day; but as soon as the sun is about setting, they always begin to flutter about and fly as much as their prison will permit them.

PHALANGIUM, in zoology, a genus of insects belonging to the order of aptera. They have eight feet, two eyes on the top of the head placed very near each other, and other two on the sides of the head: the feelers resemble legs, and the belly is round. There are nine species.

PHALANX, in Grecian antiquity, a square battalion, consisting of 8000 men, with their shields joined and pikes crossing each other; so that it was next to impossible to break it.

PHALARIS, a remarkable tyrant, born at Crete, where his ambitious designs occasioned his banishment: he took refuge in Agrigentum, a free city of Sicily, and there obtained the supreme power by stratagem. Two circumstances have contributed to preserve his name in history. His cruelty, in one act of which he gave an example of strict justice. It is thus related: Perillus, a brafs founder at Athens, knowing the cruel disposition of Phalaris, contrived a new species of punishment for him to inflict on his subjects. He cast a brazen bull, bigger than the life, with an opening in the side, to admit the victims; who being shut up in the body, a fire was kindled under it to roast them to death; and the throat was so contrived, that their dying groans resembled the roaring of a bull. The artist brought it to the tyrant, expecting a great reward. Phalaris admired the invention and workmanship, but ordered the inventor to be put into it to make the first trial. At last the tyrant was put to death by his own subjects. Some epistles are attributed to him, concerning the genuineness of which there was a dispute in the last century between Mr Boyle and Dr Bentley.

PHALARIS, or *Canary-grass*; a genus of the digynia order, belonging to the triandria class of plants. There are ten species, of which the most remarkable are the canariensis, or manured Canary-grass; and the arundinacea, or reed Canary-grass. These are both natives of Britain. The first grows by the road-sides; and is frequently cultivated for the sake of the seeds, which are found to be the best food for the Canary and other small birds. The second grows on the banks of rivers. It is used for thatching ricks or cottages, and endures much longer than straw. In Scandinavia they mow it twice a-year, and their cattle eat it. There is a variety of this cultivated in our gardens with beautifully striped leaves. The stripes are generally green and white; but sometimes they have a purplish

cast. This is commonly called painted *lady-grass*, or *Phalerus* *ladie-treffer*.

PHALEREUS (Nepos), a village and port of Athens: this last neither large nor commodious, for which reason Themistocles put the Athenians on building the Piræus; both joined to Athens by long walls. The Phalerus lay nearer the city, (Pausanias). Demetrius Phalerus, the celebrated scholar of Theophrastus, was of this place; to whom the Athenians erected above 300 statues; which were afterwards destroyed by his enemies, on his flight to Ptolemy king of Egypt, (Strabo). Here Demosthenes was wont to declaim, to accustom his voice to surmount the noise and roaring of the sea, a just and lively emblem of popular assemblies.

PHALEUCIAN VERSE, in ancient poetry, a kind of verse consisting of five feet, the first of which is a spondee, the second a dactyl, and the three last trochees.

PHALLUS, the *MOREL*; a genus of the order of fungi, belonging to the cryptogamia class of plants. There are two species.

1. The esculentus, or esculent morel, is a native of Britain, growing in woods, groves, meadows, pastures, &c. The substance, when recent, is wax-like and friable; the colour a whitish yellow, turning brownish in decay; the height of the whole fungus, about four or five inches. The stalk is thick and clumsy, somewhat tuberous at the base, and hollow in the middle. The pileus is either round or conical; at a medium about the size of an egg, often much larger; hollow within; its base united to the stalk; and its surface cellular, or latticed with irregular sinuses. The magnified seeds are oval. It is much esteemed at table both recent and dried, being commonly used as an ingredient to lighten the flavour of ragouts. We are informed by Gleditsch, that morels are observed to grow in the woods of Germany in the greatest plenty in those places where charcoal has been made. Hence the good women who collect them to sell, receiving a hint how to encourage their growth, have been accustomed to make fires in certain places of the woods, with heath, broom, vaccinium, and other materials, in order to obtain a more plentiful crop. This strange method of cultivating morels being however sometimes attended with dreadful consequences, large woods having been set on fire and destroyed by it, the magistrates thought fit to interpose his authority, and the practice is now interdicted.

2. The impudicus, stinking morel, or stinkhorns, is also a native of Britain, and found in woods and on banks. It arises from the earth under a veil or volva, shaped exactly like a hen's egg, and of the same colour, having a long fibrous radicle at its base. This egg-like valva is composed of two coats or membranes, the space between which is full of a thick, viscid, transparent matter, which, when dry, glues the coats together, and shines like varnish. In the next stage of growth, the volva suddenly bursts into several lacinated permanent segments, from the centre of which arises an erect, white, cellular, hollow stalk, about five or six inches high and one thick, of a wax-like friable substance, and most fetid cadaverous smell, conical at each end, the base inserted in a white, concave, membranaceous turbinate cup, and the summit capped with a hollow, conical pileus, an inch long, having

Phanatic Phantasy. having a reticulated cellular surface, its base detached from the stalk, and its summit umbilicated, the umbilicus sometimes perforated and sometimes closed. The under side of this pileus is covered with a clear, viscid, gelatinous matter, similar to that found between the membranes of the volva; and under this viscid matter, concealed in reticulated receptacles, are found the seeds, which when magnified appear spherical. As soon as the volva bursts, the plant begins to diffuse its intolerable odours, which are so powerful and widely expanded, that the fungus may be readily discovered by the scent only, before it appears to the sight. At this time, the viscid matter between the coats of the volva grows turbid and fulvous; and when the plant attains its full maturity, the clear viscid substance in the pileus becomes gradually discoloured, putrid, and extremely fetid, and soon afterwards turns blackish, and, together with the seeds and internal part of the pileus itself, melts away. The fetid smell then begins to remit, the fungus fades, and continues for a short time sapless and coriaceous, and at last becomes the food of worms. The cadaverous scent of this fungus greatly allures the flies; which, lighting upon the pileus, are entrapped in the viscid matter, and perish. We are informed by Gleditsch, that the vulgar people in Thuringia call the unopened volva by the ridiculous name of *ghosts and demoni eggs*; and that they collect and dry them either in the smoke or open air, and, when reduced to powder, use them in a glass of spirits as an aphrodisiac.

PHANATIC, or **FANATIC**, a visionary; one who fancies he sees spectres, spirits, apparitions, or other imaginary objects, even when awake; and takes them to be real. See **PHANTASY** and **FANATIC**.

Such are phrenetics, necromancers, hypochondriac persons, lycanthropi, &c. See **PHRENETIC**, **HYPOCHONDRIAC**, **LYCANTHROPI**.

Hence the word is also applied to enthusiasts, pretenders to revelation, new lights, prophecies, &c. See **ENTHUSIAST**, and **SECOND-SIGHT**.

PHANTASM, a term sometimes used in a synonymous sense with idea, or notion retained in the mind of an external object.

PHANTASY, or **FANCY**, the *Imagination*; the second of the powers or faculties of the sensitive or

rational soul, by which the species of objects received by the common sense are retained, recalled, further examined, and either compounded or divided. See **IMAGINATION**.

Others define the *phantasy* to be that internal sense or power, whereby the ideas of absent things are formed, and represented to the mind as if they were present. In melancholies and madmen this faculty is very strong, representing many extravagant and monstrous things, and framing its images as lively as those of sensation: whence the visions and deceptions those persons are liable to.

PHARISEES, a famous sect of the Jews, who distinguished themselves by their zeal for the traditions of the elders, which they derived from the same fountain with the written word itself; pretending that both were delivered to Moses from Mount Sinai, and were therefore both of equal authority. From their rigorous observance of these traditions, they looked upon themselves as more holy than other men: and therefore separated themselves from those whom they thought sinners or profane, so as not to eat or drink with them; and hence, from the Hebrew word *pharis*, which signifies to separate, they had the name of *Pharisees* or *Separatists*.

Their pretences to extraordinary piety drew after them the common people, who held them in the highest esteem and veneration. They held a resurrection from the dead, and the existence of angels and spirits; but, according to Josephus, this was no more than a Pythagorean resurrection, that is, of the soul only, by its transmigration into another body, and being born anew with it. From this resurrection they excluded all who were notoriously wicked, being of opinion that the souls of such persons were transmitted into a state of everlasting punishment; but as to lesser crimes, they imagined that they were punished in the bodies which the souls of those who had committed them were sent into. According to this notion it was, that Christ's disciples asked him concerning the blind man, "Who did sin, the man or his parents, that he was born blind?" With the Essenes, they held absolute predestination; and with the Sadducees, free-will: but how they reconciled these doctrines, we are nowhere informed.

P H A R M A C Y

IS the art of compounding natural and artificial substances for the purposes of medicine, in such a manner as is most suitable to the respective properties of each, and may best answer the indications of cure.

This art, which in some way or other must have been coeval with medicine itself, has for a long time been divided into the chemical and galenical. No rational principles of distinction, however, were preferred; and those which were ranked among the chemical medicines in one dispensatory, have been ranked among the galenical ones in another. Hence the London college rejected the division altogether; and Dr Lewis reckons pharmacy, in its full extent, to be no other than a branch of chemistry; and the most simple pharmaceutical preparation is chemical, in as far as

it has any dependance on the properties of its materials.

The theory of pharmacy therefore is the same with that of chemistry; as are also the operations, which remain to be discussed here only in as far as they are made subservient to the medicinal art, distinct from that which is purely chemical. The objects of pharmacy, however, are much more limited than those of chemistry: the latter comprehending, in the utmost latitude of the word, almost every substance in nature; while pharmacy regards only such bodies in the vegetable, animal, and mineral kingdoms, as, by their effects on the human frame, tend to preserve health, or to restore it when lost.

PART I. ELEMENTS OF PHARMACY.

CHAP. I.

A general view of the Properties of medicinal substances, and their relations to one another.

SECT. I. *Of Vegetables.*

1. THE medicinal virtues of vegetables differ very considerably according to the different circumstances of the plant, such as its age, the season of the year, and the soil in which it grows.

2. This is exemplified in herbs, some of which contain most odoriferous matter when young, while others have little or none till they have attained a considerable age:—In fruits, some of which contain an austere acid, afterwards changed into a sweet by maturation; others, such as the orange, at first contain a strong aromatic, and then an acid:—In roots; some of which, during the summer, contain a thin watery juice; but, if wounded early in the spring, yield rich balsamic juices, concreting into solid gummy resins, some of which, from our indigenous plants, are superior to those brought from foreign countries:—In aromatic and in fetid plants; the former of which grow stronger and more fragrant in open exposures, dry soils, and fair warm seasons; while the latter lose their smell in such circumstances. Regard must therefore be had to these and other similar circumstances in the collecting of plants for medical purposes.

3. The different parts of the same plant are very often different in quality from one another. Thus, the leaves and flowers of wormwood are intensely bitter, while the root is aromatic. The capsule inclosing the seeds of poppy has a narcotic virtue, but the seeds themselves have none.

4. The active parts of vegetables are generally capable of being extracted, without any alteration of their qualities, by some operations of a very simple nature; but by others, of a nature seemingly as simple, their nature may be entirely changed. The operations of fermentation, and of fire, are of this nature; for by means of them, the products of vegetables may be converted into substances having quite different properties from what they have naturally. Of the changes produced by these operations we shall therefore now take notice.

Art. 1. *Of the Changes produced in Vegetables, or their Juices, by Fermentation.*

5. ALL juices, or infusions, which are either simply sweet, or have a sweetness mixed with acidity, throw off by fermentation a great quantity of gross feculent matter; and are converted into a *vinous liquor*, affording by distillation an inflammable spirit.

6. The effects of the products just now mentioned on the human body are directly opposite to those of the juices from which they were produced. The latter attenuate the animal fluids, and relax the solids, in such a manner as in some cases to prove useful aperient medicines, and, if taken to too great excess, to produce dangerous fluxes; but the former always thicken the fluids, and constringe the solids.

7. In consequence of the different qualities of the juices or infusions, there are differences among the vinous liquors produced from them; but the spirit, when pure, is always found to be the same, from whatever substance it is produced.

8. Besides the gross matter thrown off during the fermentation, there is separated from several wines an acid saline substance named *tartar*; of a reddish or white colour, according to the wine which produces it. The red colour is not essential to the salt; for red tartar may be purified by solution in water, and then the tartar of all wines is found to be the same.

9. In fermentation there is also separated from the fermenting substance a great quantity of incoercible vapour, formerly known by the name of *gas*, but now discovered to be one of the component parts of our atmosphere, and the same with that which is called *fixed air*; concerning which see the articles *AIR*, *FIXED AIR*, *GAS*, &c.

10. Many substances, not susceptible of fermentation by themselves, may yet be brought into that state by an admixture of artificial ferments, or even of those which admit of a spontaneous fermentation, together with a proper quantity of water. This method is sometimes followed with vegetable matters intended for distillation, on a supposition that a slight fermentation will unlock their texture, and give out their principles more freely than otherwise; but it is much to be doubted whether this is really the case. The operation of fermentation is the same from first to last; and if its last effects are to convert the whole, or a great part, of the essential oil and saline parts of the vegetable into ardent spirit, it may reasonably be thought that its first effects must be to convert a part of these substances into the same spirit. At any rate, it is universally agreed, that when fermentation is employed with the abovementioned view, it must be continued only for a very short time.

11. The juices of fruits, though very susceptible of fermentation in their natural state, yet, when boiled till they become thick, are found to be indispensed to ferment; and this not only in their thick state, but when diluted again with water; though there appears to be scarcely any other alterations produced in them by the boiling. Hence liquids, prone to fermentation, may thus be preferred. How far this diminution of their fermentability may affect their medical virtues, is not as yet clear.

12. The degree of the species of fermentation, by which wines and inflammable spirits are produced, is called *vinous fermentation*. If the process is further protracted, more gross matter is thrown off, and new changes succeed, but in a slower and less tumultuary manner than before. The heating inebriating wine becomes by degrees a cooling acid vinegar, which seems to counteract the effects of the other: the more the wine abounded with inflammable spirit, the more does the vinegar abound with unflammable acid.

There are, however, certain qualities of vegetables, which are not completely subdued even by this second stage of fermentation; some vinegars being apparent-

and viscid matter than others. By adding to the fermentable liquor subjects of other kinds, the qualities both of wines and vinegars may be still further diversified, so as to adapt them to particular medicinal uses.

13. It is observable, that though the acetous fermentation will always succeed the vinous, unless industriously prevented, yet it is not always preceded thereby; for many, perhaps all, fermentable liquors may be made to pass to the acetous state, without any intermediate period of true vinosity.

14. If the process is still further continued, further changes takes place. The matter putrefies: and at length what little liquor remains unevaporated, is found to be mere water, and the solid substance at the bottom appears to be the same with common mould.

15. This is reckoned by the chemists one of the stages of fermentation, and distinguished by the name of the *putrefactive stage*: it is far more general in its object than the other two; every vegetable matter being susceptible of putrefaction, but some particular kinds only being adapted to vinous or acetous fermentation.

16. Putrefaction discovers one difference in vegetables, which seems worthy of being remarked. The generality of vegetables rot and turn to mould, without yielding any very offensive smell from the beginning to the end of the resolution: but there are some which emit, throughout the whole process, a strong fetor, very nearly of the same kind with that which accompanies the putrefaction of animal-substances. See the articles FERMENTATION and PUTREFACTION.

Art. 2. Productions from Vegetables by Fire.

17. FIRE, the other grand agent in the resolution of bodies, produces in vegetables decompositions of a different kind. Its general effects are the following.

18. Vegetable substances, burnt in the open air, are reduced partly into ashes, and partly into flame and smoke; which last, condensed in long canals, forms a nauseous black foot. In the burning of moist vegetables, an acid vapour accompanies the smoke; but the foot is never found to partake of it.

19. Vegetables urged with a red heat in close vessels (the vessel containing the subject being made to communicate with another placed beyond the action of the fire for receiving the matters forced out by the heat) give over a watery liquor called *phlegm*; an acid liquor called *spirit*; an elastic incoercible vapour, which appears to be partly fixed and partly inflammable air, and to which an exit must be occasionally allowed lest it burst the vessels or blow off the receiver; a thin oil, at length a very thick dark-coloured oil, both which are of an acrimonious taste, and a burnt fetid smell, whence they are called *emphyreumatic oils*. There remains behind a black coal, not dissoluble in any kind of liquors, nor susceptible of putrefaction, not alterable by the most vehement degree of fire so long as the air is excluded, but which, on admitting air to it, burns without flaming, and with little or no smoke, and leaves a very small quantity of white ashes.

20. The white ashes of vegetables, infused or boiled in water, impart to it a pungent saline substance, called *fixt alkaline salt*, which may be separated in a solid form by evaporating the water. The remaining part of the ashes, which is by far the largest in quantity, is a pure earth differing from that which is the result of putrefaction, in being readily dissoluble by every acid liquor, while the other is not acted upon by any acid.

21. Such is the general analysis of vegetables by fire. But there are some vegetables, which, as they seem to shew, during putrefaction, some analogy in their matter with that which constitutes animal-bodies, discover also a like analogy in the present resolution; yielding little or no acid; and, instead of a fixt alkaline salt which remains in the ashes, affording a volatile alkaline salt, which arises along with the aqueous and oily principles.

22. Alkaline salts, and acid or sour substances, are looked upon as being opposite in their nature to one another. Most of the bodies which are dissoluble in alkaline liquors, are precipitated or thrown out from the solution on the addition of an acid; and most of those which are dissoluble in acids, are in like manner precipitated by alkalis. If an acid and an alkali be directly mixed together, there generally ensues an effervescence or tumultuary discharge of air-bubbles, owing to the fixed air they contain; but if they are previously deprived of their fixed air, no effervescence takes place.

23. In all cases, the alkali and acid uniting together, compose a new body, called a *neutral salt*, which has neither the sourness of the one ingredient, nor the peculiar pungency of the other, and which will not dissolve those substances which either the acid or the alkali, separately, would dissolve.

24. To these characters it may be added, that alkaline salts change the colour of blue flowers or their infusions, as of violets, to a green, and acids to a red; while the neutral compound, formed by the coalition of the two, makes no alteration in the colour.

25. It must be observed, however, that to change blue flowers to a green, is not universally a mark of alkalies, for some solutions of earthy bodies in acids have the same effect: these last may be distinguished from alkalies, by adding to them a known alkali, which will immediately precipitate the earth, and form a neutral compound with the acid.

26. Fixed alkaline salts, perfectly purified, appear to be one and the same, whatever kind of vegetable they were produced from; those of some marine plants excepted. In volatile alkalies, and in the pure earthy part of the ashes, there appears to be, respectively, the like identity.

27. Emphyreumatic oils differ somewhat in the degree of acrimony and fetidness, and the acid spirits differ in degree of strength, or in the quantity of water they are diluted with; how far they may differ in any other respects is little known, these preparations having been rarely used or examined.

28. It may be observed, that the alkaline salts, both of the fixed and of the volatile kind, are entirely creatures of the fire, being seldom if ever found to exist naturally in any vegetable: the oil, doubtless, pre-existed in the subject, but owes its acrimony and fetidness

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to the fire; for the most mild and insipid oils receive the same qualities on being urged with the same degree of heat: the acid, which is likewise naturally contained in vegetable subjects, proves always tainted in the present process with the ill smell and taste of the oil that accompanies it; but whether the acid itself suffers any change in its nature, is unknown.

29. When chemistry began first to be formed into a rational science, and to examine the component parts and internal constitution of bodies, it was imagined, that this resolution of vegetables by fire, discovering to us all their active principles, unclogged and unmixed with one another, would afford the surest means of judging of their medicinal powers. But, on prosecuting these experiments, it was soon found, that they were insufficient for that end; that the analyses of poisonous and efulent plants agreed often as nearly with one another as two analyses of one plant: that by the action of a burning heat, the principles of vegetables are not barely separated, but altered, transposed, and combined into new forms; inasmuch that it was impossible to know what form they existed in, and what qualities they were endowed with, before these changes and transpositions happened.

Art. 3. *Substances naturally contained in Vegetables, and separable by Art without Alteration of their native Qualities.*

I. *Gross oils* abound chiefly in the kernels of fruits, and in certain seeds; from which they are commonly extracted by expression, and hence are distinguished by the name of *expressed oils*. They are contained also in all the parts of all vegetables that have been examined, and may be forced out by vehemence of fire; but here their qualities are greatly altered in the process by which they are extracted or discovered.

31. These oils, in their common state, are not dissoluble either in vinous spirits or in water, though, by means of certain intermedia, they may be united both with one and the other. Thus a skilful interposition of sugar renders them miscible with water into what are called *sacchari* and *oily draughts*; by the intervention of gum or mucilage, they unite with water into a milky fluid; by alkaline salts they are changed into a soap, which is miscible both with watery and spiritous liquors, and is perfectly dissolved by the latter into an uniform transparent fluid. The addition of any acid to the soapy solution absorbs the alkaline salt; and the oil, which of course separates, is found to have undergone this remarkable change, that it now dissolves, without any intermedium, in pure spirit of wine.

32. Expressed oils, exposed to the cold, lose greatly of their fluidity; some of them, in a small degree of cold, congeal into a consistent mass. Kept for some time in a warm air, they become thin and highly rancid; their soft, lubricating, and relaxing quality, is changed into a sharp acrimonious one: and in this state, instead of allaying, they occasion irritation; instead of obviating corrosive humours, they corrode and inflame. These oils are liable to the same noxious alteration while contained in the original subject; hence the rancidity which the oily seeds and kernels, as almonds, and those called the *cold seeds*, are so liable to contract in keeping. Nevertheless, on triturating these seeds and kernels with water, the oil, by the inter-

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vention of the other matter of the subject, unites with the water into an emulsion or milky liquor, which, instead of growing rancid, turns four on standing. The rancidity also to which the oils are subject, appears to be owing to the impurities contained in them; for pure oil is found to be quite incorruptible.

33. In the heat of boiling water, and even in a degree of heat as much exceeding this as the heat of boiling water does that of the human body, these oils suffer little dissipation of their parts. In a greater heat, they emit a pungent vapour, seemingly of the acid kind; and when suffered to grow cold again, they are found to have acquired a greater degree of consistency than they had before, together with an acid taste. In a heat approaching to ignition, in close vessels, greatest part of the oil arises in an empyreumatic state, a black coal remaining behind.

34. II. *Gross sebaceous matter*. From the kernels of some fruits, as that of the chocolate-nut, we obtain, instead of a fluid oil, a substance of a butyrous consistency; and from others, as the nutmeg, a solid matter as firm as tallow. These concretes are most commodiously extracted by boiling the subject in water; the sebaceous matter, liquefied by the heat, separates and arises to the surface, and resumes its proper consistency as the liquor cools.

35. The substances of this class have the same general properties with expressed oils, but are less disposed to become rancid in keeping than most of the common fluid oils.

36. III. *Essential oils* are obtained only from those vegetables, or parts of vegetables, that are considerably odorous. They are the direct principle, in which the odour, and oftentimes the warmth, pungency, and other active powers of the subject, reside; whence their name of *essence* or *essential oils*.

37. Essential oils unite with rectified spirit of wine, and compose with it one homogeneous transparent fluid; though some of them require for this purpose a much larger proportion of the spirit than others. Water also, though it does not dissolve their whole substance, may be made to imbibe some portion of their more subtle matter, so as to become considerably impregnated with their flavour: by their admixture with sugar, gum, the yolk of an egg, or alkaline salts, they are made totally dissoluble in water. Digested with volatile alkalies, they undergo various changes of colour, and some of the less odorous acquire considerable degrees of fragrance; whilst fixed alkalies universally impair their odour.

38. In the heat of boiling water, these oils totally exhale: and on this principle they are commonly extracted from subjects that contain them; for no other fluid that naturally exists in vegetables is exhalable by that degree of heat, except the aqueous moisture, from which greatest part of the oil is easily separated. Some of these oils arise with a much less heat, a heat little greater than that in which water begins visibly to evaporate. In their resolution by a burning heat, they differ little from expressed oils.

39. Essential oils, exposed for some time to a warm air, suffer an alteration very different from that which the expressed undergo. Instead of growing thin, rancid, and acrimonious, they gradually become thick, and at length harden into a solid, brittle concrete, with

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40. The admixture of a concentrated acid instantly produces in essential oils a change nearly similar to that which time effects. In making these kinds of mixtures, the operator ought to be on his guard; for when a strong acid, particularly that of nitre, is poured hastily into an essential oil, a great heat and ebullition ensue, and often an explosion happens, or the mixture bursts into a flame. The union of expressed oils with acids is accompanied with much less conflict.

41. *IV. Concrete essential oil.* Some vegetables, as roses and elecampane roots, instead of a fluid essential oil, yield a substance possessing the same general properties, but of a thick or sebaceous consistence. This substance appears to be of as great volatility and subtlety of parts as the fluid oils: it equally exhales in the heat of boiling water, and concretes upon the surface of the collected vapour. The total exhalation of this matter, and its concreting again into its original consistent state, without any separation of it into a fluid and a solid part, distinguishes it from essential oils that have been thickened or indurated by age or by acids.

42. *V. Camphor.* This is volatile like essential oils, and soluble both in oils and inflammable spirits: it unites freely with water by the intervention of gum, but very sparingly and imperfectly by the other intermedia that render oils miscible with watery liquors. It differs from the sebaceous as well as fluid essential oils, in suffering no sensible alteration from long keeping; in being totally exhalable, not only by the heat of boiling water, but in a warm air, without any change or separation of its parts, the last particle that remains unexhaled appearing to be of the same nature with the original camphor; in its receiving no empyreumatic impression, and suffering no resolution, from any degree of fire to which it can be exposed in close vessels, though readily combustible in the open air; in being dissolved by concentrated acids into a liquid form; and in several other properties which it is needless to specify in this place.

43. *VI. Resin.* Essential oils, indurated by age or acids, are called *resins*. When the indurated mass has been exposed to the heat of boiling water, till its more subtle part, or the pure essential oil, that remained in it, has exhaled, the gross matter left behind is likewise called *resin*. We find in many vegetables resins analogous both to one and the other of these concretes; some containing a subtle oil, separable by a heat of boiling water; others containing nothing that is capable of exhaling in that heat.

44. Resins in general dissolve in redified spirit of wine, though some of them much more difficultly than others: it is chiefly by means of this dissolved that they are extracted from the subjects in which they are contained. They dissolve also in oils, both expressed and essential; and may be united with watery liquors

by means of the same intermedia which render the fluid oils miscible with water. In a heat less than that of boiling water, they melt into an oily fluid; and in this state they may be incorporated one with another. In their resolution by fire, in close vessels, they yield a manifest acid, and a large quantity of empyreumatic oil.

45. *VII. Gum* differs from the foregoing circumstances in being uninflamable: for though it may be burnt to a coal, and thence to ashes, it never yields any flame. It differs remarkably also in the proportion of the principles into which it is resolved by fire; the quantity of empyreumatic oil being far less, and that of acid far greater. In the heat of boiling water, it suffers no dissipation; nor does it liquefy like resins; but continues unchanged, till the heat is so far increased as to scorch or turn it to a coal.

46. By a little quantity of water it is softened into a viscous adhesive mass, called *mucilage*: by a larger quantity it is dissolved into a fluid, which proves more or less glutinous according to the proportion of gum. It does not dissolve in vinous spirits, or in any kind of oil; nevertheless, when softened with water into a mucilage, it is easily miscible both with the fluid oils and with resins, which by this means become soluble in watery liquors along with the gum, and are thus excellently fitted for medicinal purposes.

47. As oily and resinous substances are thus united to water by the means of gum, so gums may in like manner be united to spirit of wine by the intervention of resins and essential oils; though the spirit does not take up near so much of the gum as water does of the oil or resin.

48. Acid liquors, though they thicken pure oils, or render them consistent, do not impede the dissolution of gum, or of oils blended with gum. Alkaline salts, on the contrary, both fixed and volatile, though they render pure oils dissolvable in water, prevent the solution of gum, and of mixtures of gum and oil. If any pure gum be dissolved in water, the addition of any alkali will occasion the gum to separate, and fall to the bottom in a consistent form: if any oily or resinous body was previously blended with the gum, this also separates, and either sinks to the bottom, or rises to the top, according to its gravity.

49. *VIII. Gum-resin.* By gum-resin is understood a mixture of gum and resin. Many vegetables contain mixtures of this kind, in which the component parts are so intimately united, with the interposition perhaps of some other matter, that the compound, in a pharmaceutical view, may be considered as a distinct kind of principle; the whole mass dissolving almost equally in aqueous and in spirituous liquors; and the solutions being not turbid or milky, like those of the grosser mixtures of gum and resin, but perfectly transparent. Such is the altringent matter of bilwort root, and the bitter matter of gentian.

50. *IX. Saline matter.* Of the saline juices of vegetables there are different kinds; the sweet and the acid ones are the most plentiful, and those which are the most known.

51. These juices, exposed to a heat equal to that of boiling water, suffer generally no other change than the evaporation of their watery moisture; the saline matter remaining behind, along with such of the other

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not volatile parts as were blended with it in the juice; from many, after the exhalation of great part of the water, the saline matter gradually separates in keeping, and concretes into little solid masses, leaving the other substances dissolved, or in a moist state; from others, no means have yet been found of obtaining a pure concrete salt.

52. These salts dissolve not only in water like other saline bodies, but many of them, particularly the sweet, in rectified spirit also. The gross oily and gummy matter with which they are almost always accompanied in the subject, dissolves freely along with them in water, but is by spirit in great measure left behind. Such heterogeneous matters as the spirit takes up are almost completely retained by it, while the salt concretes; but of those which water takes up, a considerable part always adheres to the salt. Hence essential salts, as they are called, prepared in the common manner from the watery juices of vegetables, are always found to partake largely of the other soluble principles of the subject; whilst those extracted by spirit of wine prove far more pure. By means of rectified spirit, some productions of this kind may be excellently freed from their impurities; and perfect saccharine concretions be obtained from many of our indigenous sweets.

53. There is another kind of saline matter, obtained from some resinous bodies, particularly from benzoin, of a different nature from the foregoing, and supposed by some of the chemists to be a part of the essential oil of the resin, coagulated by an acid, with the acid more predominant or more disengaged than in the other kinds of coagulated or indurated oils. These concretions dissolve both in water and in vinous spirits, though difficultly and sparingly in both: they show some marks of acidity, have a considerable share of smell like that of the resin they are obtained from, exhale in a heat equal to that of boiling water, or a little greater, and prove inflammable in the fire.

General observations on the foregoing principles.

54. 1st, Essential oils, as already observed, are obtainable only from a few vegetables, and camphor from a much smaller number: but gross oil, resin, gum, and saline matter, appear to be common, in greater or less proportion, to all; some abounding more with one, and others with another.

55. 2dly, The several principles are in many cases intimately combined, so as to be extracted together from the subject by those solvents, in which some of them, separately, could not be dissolved. Hence watery infusions, and spirituous tinctures of a plant, contain, respectively, more than water or spirit is the proper dissolvent of.

56. 3dly, After a plant has been sufficiently infused in water, all that spirit extracts from the residuum may be looked upon as consisting wholly of such matter as directly belongs to the action of spirit. And contrariwise, when spirit is applied first, all that water extracts afterwards may be looked upon as consisting only of that matter of which water is the direct dissolvent.

57. 4thly, If a vegetable substance, containing all the principles we have been speaking of, be boiled in water, the essential oil, whether fluid or concrete, and

the camphor and volatile essential salt, will gradually exhale with the steam of the water, and may be collected by receiving the steam in proper vessels placed beyond the action of the heat. The other principles not being volatile in this degree of heat, remain behind; the gross oil and sebaceous matter float on the top; the gummy and saline substance, and a part of the resin, are dissolved by the water, and may be obtained in a solid form by straining the liquor, and exposing it to a gentle heat till the water has exhaled. The rest of the resin still retained by the subject may be extracted by spirit of wine, and separated in its proper form by exhaling the spirit. On these foundations most of the substances contained in vegetables may be extracted, and obtained in a pure state, however they may be compounded together in the subject. By this operation, however, some very considerable change is undoubtedly produced by the fire; since, by pouring back the liquor which has arisen in distillation upon that which remains in the still, we shall never be able to recompose a liquor like that before it was distilled.

58. 5thly, Sometimes one or more of the principles is found naturally disengaged from the others, lying in distinct receptacles within the subject, or extravasated and accumulated on the surface. Thus, in the dried roots of angelica, cut longitudinally, the microscope discovers veins of resin. In the flower-cups of hypericum, and the leaves of the orange-tree, transparent points are distinguished by the naked eye, which, on the first view, seem to be holes; but, on a closer examination, are found to be little vesicles filled with essential oil. In the bark of the fir, pine, larch, and some other trees, the oily receptacles are extremely numerous, and so copiously supplied with the oily and resinous fluid, that they frequently burst, especially in the warm climates, and discharge their contents in great quantities. The acacia tree in Egypt, and the plum and cherry among ourselves, yield almost pure gummy exudations. From a species of ash is secreted the saline sweet substance manna; and the only kind of sugar which the ancients were acquainted with, appears to have been a natural exudation from the cane.

59. 6thly, The foregoing principles are, so far as is known, all that naturally exist in vegetables; and all that art can extract from them, without such operations as change their nature, and destroy their original qualities. In one or more of these principles, the colour, smell, taste, and medicinal virtues of the subject, are almost always found concentrated.

60. 7thly, In some vegetables, the whole medicinal activity resides in one principle. Thus, in sweet almonds, the only medicinal principle is a gross oil; in horse-radish root, an essential oil; in jalap-root, a resin, in marshmallow-root, a gum; in the leaves of fennel, a saline acid substance.

61. 8thly, Others have one kind of virtue residing in one principle, and another in another. Thus Peruvian bark has an astringent resin and a bitter gum; wormwood, a strong-flavoured essential oil, and a bitter gum-resin.

62. 9thly, The gross insipid oils and sebaceous matters, the simple insipid gums, and the sweet and acid saline substances, seem nearly to agree in their medicinal

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63. 10thly, But essential oils, resins, and gum-resins, differ greatly in different subjects. As essential oils are universally the principle of odour in vegetables, it is obvious that they must differ in this respect as much as the subjects from which they are obtained. Resins frequently partake of the oil, and consequently of the differences depending thereon; with this further diversity, that the gross resinous part often contains other powers than those which reside in oils. Thus from wormwood a resin may be prepared, containing not only the strong smell and flavour, but likewise the whole bitterness of the herb; from which last quality the oil is entirely free. The bitter, astringent, purgative, and emetic virtues of vegetables, reside generally in different sorts of resinous matter, either pure, or blended with gummy and saline parts; of which kind of combinations there are many so intimate, that the component parts can scarcely be separated from one another, the whole compound dissolving almost equally in aqueous and spirituous menstrua.

64. 11thly, There are some substances also which, from their being totally dissoluble in water, and not at all in spirit, may be judged to be mere gums; but which, nevertheless, possess virtues never to be found in the simple gums. Such are the astringent gum called *acacia*, and the purgative gum extracted from aloes.

65. 12thly, It is supposed that vegetables contain certain subtle principles or presiding spirits, different in different plants, of too great tenuity to be collected in their pure state, and of which oils, gums, and resins, are only the matrices or vehicles. This inquiry is foreign to the purposes of pharmacy, which is concerned only about grosser and more sensible objects. When we obtain from an odoriferous plant an essential oil, containing in a small compass the whole fragrance of a large quantity of the subject, our intentions are equally answered, whether the substance of the oil be the direct odorous matter, or whether it has diffused through it a fragrant principle more subtle than itself. And when this oil, in long keeping, loses its odour, and becomes a resin, it is equal, in regard to the present considerations, whether the effect happens from the avolation of a subtle principle, or from a change produced in the substance of the oil itself.

SECT. II. *Animals.*

66. In animal-bodies we find certain substances which have a great resemblance, in their general properties, to those of the vegetable kingdom.

67. Animal oils and fats, like the gross oils of vegetables, are not of themselves dissoluble either in water or vinous spirits: but they may be united with water by the intervention of gum or mucilage; and most of them may be changed into soap, and thus rendered miscible with spirit, as well as water, by fixt alkaline salts.

68. The odorous matter of some odoriferous animal-substances, as musk, civet, castor, is, like essential oils, soluble in spirit of wine, and volatile in the heat of boiling water. Cartheuser relates, that from castor an actual essential oil has been obtained, in very

small quantity, but of an exceedingly strong diffusive smell.

69. The vesicating matter of cantharides, and those parts of sundry animal-substances in which their peculiar tastes reside, are dissolved by rectified spirit, and seem to have some analogy with resins and gummy resins.

70. The gelatinous principle of animals, like the gum of vegetables, dissolves in water, but not in spirit or in oils; like gums also, it renders oils and fats miscible with water into a milky liquor.

71. Some insects, particularly the ant, are found to contain an acid juice which approaches nearly to the nature of vegetable acids.

72. There are, however, sundry animal-juices, which differ greatly, even in these general kinds of properties, from the corresponding ones of vegetables. Thus animal-serum, which appears analogous to vegetable gummy juices, has this remarkable difference, that though it mingles uniformly with cold or warm water, yet, on considerably heating the mixture, the animal-matter separates from the watery fluid, and concretes into a solid mass. Some have been apprehensive, that the heat of the body, in some distempers, might rise to such a degree as to produce this dangerous or mortal concretion of the ferous humours: but the heat requisite for this effect is greater than the human body appears capable of sustaining, being nearly about the middle point between the greatest human heat commonly observed and that of boiling water.

73. The soft and fluid parts of animals are strongly disposed to run into putrefaction; they putrefy much sooner than vegetable matters, and when corrupted prove more offensive.

74. This process takes place, in some degree, in the bodies of living animals, as often as the juices stagnate long, or are prevented, by an obstruction of the natural emunctories, from throwing off their more volatile and corruptible parts.

75. During putrefaction, a quantity of air is generated, all the humours become gradually thinner, and the fibrous parts more lax and tender. Hence the tympany which succeeds the corruption of any of the viscera, or the imprudent suppression of dysenteries by astringents; and the weakness and laxity of the vessels observable in scurvy, &c.

76. The crassamentum of human blood changes by putrefaction into a dark livid-coloured liquor; a few drops of which tinge the serum of a tawny hue; like that of the ichor of sores and dysenteric fluxes, and of the white of the eye, the saliva, the serum of blood drawn from a vein, and that which oozes from a blister in deep scurvy, and in the advanced state of malignant fevers.

77. The putrid crassamentum changes a large quantity of recent urine to a flame-coloured water so common in fevers and in the scurvy. This mixture, after standing an hour or two, gathers a cloud resembling what is seen in the crude water of acute distempers, with some oily matter on the surface, like the serum which floats on scorbutic urine.

78. The serum of blood deposits, in putrefaction, a sediment resembling well-digested pus, and changes to a faint olive green. A serum, so far putrefied as

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to become green, is perhaps never to be seen in the vessels of living animals; but in dead bodies this serum is to be distinguished by the green colour which the flesh acquires in corrupting. In fatted meats, this is commonly ascribed to the brine, but erroneously; for that has no power of giving this colour, but only of qualifying the taste, and in some degree the ill effects, of corrupted aliments. In foul ulcers, and other sores, where the serum is left to stagnate long, the matter is likewise found of this colour, and is then always acrimonious.

79. The putrefaction of animal-substances is prevented or retarded by all saline matters, even by the fixt and volatile alkaline salts, which have generally been supposed to produce a contrary effect. Of all the salts that have been made trial of, sea-salt seems to resist putrefaction the least: in small quantities, it even accelerates the process. The vegetable bitters, as chamomile-flowers, are much stronger antiseptics, not only preserving flesh long uncorrupted, but likewise somewhat correcting it when putrid: the mineral acids have this last effect in a more remarkable degree. Vinous spirits, aromatic and warm substances, most of the diaphoretic drugs, and the acid plants falsely called *alkalescent*, as scurvy-grass and horse-radish, are also found to resist putrefaction; and some of the absorbent earths, as chalk, to promote it.

80. It is observable, that notwithstanding the strong tendency of animal-matters to putrefaction, yet broths made from them with the admixture of vegetables, instead of putrefying, turn sour. Dr Pringle finds, that when animal-flesh in substance is beaten up with bread or other farinaceous vegetables, and a proper quantity of water, into the consistence of a pap, this mixture likewise, kept in a heat equal to that of the human body, grows in a little time sour; whilst the vegetable matters, without the flesh, suffer no such change. See the *Appendix* to his *Observations on the Diseases of the Army*.

81. Animal-substances, burnt in the open air, are resolved, like vegetables, into soot and ashes; but with this difference, that no fixt alkaline salt can be obtained from the ashes, and that no acid vapour accompanies the smoke. They emit, during the burning, a fetid smell of a peculiar kind, by which animal-substances may be distinguished at once from all those of the vegetable kingdom. In close vessels, they give over, after the watery moisture, a volatile alkaline salt, which either concretes into a solid form, or dissolves in the water, and thus composes what is called *spirit*; together with an empyreumatic oil, of a more fetid kind than the oils of vegetables, without the least footstep of acid throughout the whole process. A black coal remains, which, in the open air, burns into white ashes void of saline matter.

82. It was observed in the preceding section, that some few vegetables, in this resolution of them by fire, discover some agreement in their matter with bodies of the animal kingdom, yielding a volatile alkaline salt in considerable quantity, with little or nothing of the acid or fixed alkali which the generality of vegetables afford. In animal-substances also there are some exceptions to the general analysis: from animal-fats, instead of a volatile alkali, an acid liquor is obtained, and their empyreumatic oil wants the peculiar offensiveness of the other animal-oils.

SECT. III. Minerals.

Art. 1. Oils and Bitumens.

83. In the mineral kingdom is found a fluid oil, called *naphtha* or *petroleum*, floating on the surface of waters, or issuing from clefts of rocks, particularly in the eastern countries, of a strong smell, very different from that of vegetable or animal oils, limpid almost as water, highly inflammable, not soluble in spirit of wine, and more averse to union with water than any other oils.

84. There are different sorts of these mineral oils, more or less tinged, of a more or less agreeable, and a stronger or weaker smell. By the admixture of concentrated acids, which raise no great heat or conflict with them, they become thick, and at length consistent; and in these states are called *bitumens*.

85. These thickened or concreted oils, like the corresponding products of the vegetable kingdom, are generally soluble in spirit of wine, but much more difficultly, more sparingly, and for the most part only partially: they liquefy by heat, but require the heat to be considerably stronger. In a proper degree of heat they give out a fluid oil, greatly resembling the native petrolea, a small quantity of a black coaly matter remaining behind. Their smells are various; but all of them, either in their natural state, or when melted or set on fire, yield a peculiar kind of strong scent, called, from them, *bituminous*.

Art. 2. Earths.

86. In treating of vegetables and animals, we forbore to speak of their earthy matters, that the distinguishing characters of the several classes of earthy bodies might be the easier apprehended, by having them placed here in one synoptical view: the little impropriety, of joining the vegetable and animal earths to the mineral, must be overlooked for the sake of that advantage. Under the mineral earths are included stones, these being no other than earths in an indurated state. The different kinds of these bodies hitherto taken notice of, are the following.

1. *Earths soluble in the nitrous, marine, and vegetable acids, but not at all, or exceeding sparingly, in the vitriolic acid.* When previously dissolved in other acids, they are precipitated by the addition of this last, which thus unites with them into insipid, or nearly insipid concretes, not dissoluble in any liquor. Of this kind are,

87. [1.] The mineral calcareous earth: distinguished by its being convertible, in a strong fire without addition, into an acrimonious calx called quicklime. This earth occurs in a variety of forms in the mineral kingdom. The fine soft chalk, the coarser lime-stones, the hard marbles, the transparent spars, the earthy matter contained in waters, and which, separating from them, incrustates the sides of caverns or hangs in icicles from the tops, receiving from its different appearances different appellations; how strongly soever some of these bodies have been recommended for particular medicinal purposes, are at bottom no other than different forms of this calcareous earth; simple pulverization depriving them of the superficial characters by which they are distinguished in the mass. Most of them contain generally a greater or less admixture of some of the

Elements. the indissoluble kinds of earth; which, however, affects their medicinal qualities no otherwise than by the addition which it makes to their bulk. Chalk appears to be one of the purest, and is therefore in general preferred. They all burn into a strong quicklime: in this state, a part of them dissolves in water, which thus becomes impregnated with the astringent and lithontriptic powers that have been erroneously ascribed to some of the earths in their natural state.

88. [2.] The animal calcareous earth: *burning into quicklime, like the mineral.* Of this kind are oyster-shells, and all the marine shells that have been examined; though with some variation in the strength of the quicklime produced from them.

89. [3.] The earth of bones and horns: *not at all burning into quicklime.* This kind of earth is more difficult of solution in acids than either of the preceding. It is accompanied in the subject with a quantity of gelatinous matter, which may be separated by long boiling in water, and more perfectly by burning in the open air: the earth may be extracted also from the bone or horn, though difficultly, by means of acids; whereas vegetables, and the soft parts of animals, yield their pure earth by burning only.

II. *Earths soluble with ease in the vitriolic as well as other acids; and yielding, in all their combinations therewith, saline concretes soluble in water.*

90. [1.] Magnesia alba: *composing with the vitriolic acid a bitter purgative liquor.*

91. [2.] Aluminous earth: *composing with the vitriolic acid a very astringent liquor.*

III. *Earths, which by digestion in acids, either in the cold or in a moderate warmth, are not at all dissolved.*

92. [1.] Argillaceous earth: *becoming hard, or acquiring an additional hardness, in the fire.* Of this kind of earth there are several varieties, differing in some particular properties: as the purer *clays*, which when moistened with water form a very viscous mass, difficultly diffusible through a large quantity of the fluid, and slowly subsiding from it; *boles*, less viscous, more readily miscible with water, and more readily subsiding; and *ochres*, which have nothing of the viscosity of the two foregoing, and are commonly impregnated with a yellow or red ferrugineous calx.

93. [2.] Crystalline earth: *naturally hard, so as to strike sparks with steel; becoming friable in a strong fire.* Of this kind are flints, crystals, &c. which appear to consist of one and the same earth, differing in the purity, hardness, and transparency of the mass.

94. [3.] Gypseous earth: *reducible by a gentle heat into a soft powder, which unites with water into a mass, somewhat viscous and tenacious while moist, but quickly drying and becoming hard.* A greater heat deprives the powder of this property, without occasioning any other alteration. Such are the transparent *selenitæ*; the fibrous stony masses improperly called *English talc*; and the granulated gypsa, or plaster of Paris stones.

95. [4.] Talky earth: *scarcely alterable by a vehement fire.* The masses of this earth are generally of a fibrous or leafy texture; more or less pellicid, bright, or glittering; smooth and unctuous to the touch; too flexible and elastic to be easily pulverized; soft, so as to be cut with a knife. In these respects some of the gypseous earths greatly resemble them: but the difference is readily discovered by fire; a weak heat redu-

cing the gypseous to powder, while the strongest makes no other alteration in the talky, than somewhat diminishing their flexibility, brightness, and unctuousity.

Art. 3. Metals.

96. Of metals, the next division of mineral bodies, the most obvious characters are, their peculiar bright aspect, perfect opacity, and great weight: the lightest of them is *lix*, and the heaviest upwards of 19 times heavier than an equal bulk of water.

97. They all melt in the fire, except *platina*; a metallic body which has not been applied to any medicinal use, and which is therefore excluded from this general view of medicinal subjects.

98. Gold and silver, how long soever they are continued in fusion, remain unchanged and undiminished. The others, if air is admitted to them, are gradually converted, with different degrees of facility, into a powdery or friable substance called *calx*, destitute of the metallic aspect, and much lighter in proportion to its bulk than the metal itself. This change in their obvious properties is generally accompanied with a notable alteration in their medicinal virtues: thus quicksilver, which, taken into the body in its crude state and undivided, seems inactive; when calcined by fire, proves, even in small doses, a strong emetic and cathartic, and in smaller ones a powerful alterative in chronic disorders; while regulus of antimony, on the contrary, is changed, by the same treatment, from a high degree of virulence to a state of inactivity.

99. Calces of mercury and arsenic exhale in a heat below ignition: those of lead and bismuth, in a red or low white heat, run into a transparent glass: the others are not at all vitrescible, or not without extreme vehemence of fire. Both the calces and glasses recover their metallic form and qualities again, by the skilful addition of any kind of inflammable substance that does not contain a mineral acid.

100. All metallic bodies dissolve in acids; some only in particular acids, as silver and lead in the nitrous; some only in compositions of acids, as gold in a mixture of the nitrous and marine; and others, as iron and zinc, in all acids. Some likewise dissolve in all alkaline liquors, as copper; and others, as lead, in expressed oils. Fused with a composition of sulphur and fixed alkaline salt, they are all, except zinc, made soluble in water.

101. All metallic substances dissolved in saline liquors have powerful effects in the human body, tho' many of them appear in their pure state to be inactive. Their activity is generally in proportion to the quantity of acid combined with them: thus lead, which in its crude form has no sensible effect, when united with a small portion of vegetable acid into *cerusa*, discovers a low degree of the styptic and malignant quality which it so strongly exerts when blended with a larger quantity of the same acid, into what is called *saccharum saturni*: and thus mercury, with a certain quantity of the marine acid, forms the violent corrosive sublimate, which, by diminishing the proportion of acid, becomes the mild medicine called *mercurius dulcis*.

Art. 4. Acids.

102. The mineral acids are distinguished by the names of the concretes from which they have been principally

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cipally extracted; the *vitriolic* from vitriol, the *nitrous* from nitre or saltpetre, and the *marine* from common sea-salt. They are all highly corrosive, inasmuch as not to be safely touched, unless largely diluted with water, or united with such substances as obtund or suppress their acidity. Mixed hastily with vinous spirits, they raise a violent ebullition and heat, accompanied with a copious discharge of noxious fumes: a part of the acid unites intimately with the vinous spirit into a new compound void of acidity, called *dulcified spirit*. It is observable, that the marine acid is much less disposed to this union with spirit of wine than either of the other two: nevertheless, many of the compound salts resulting from the combination of earthy and metallic bodies with this acid, are soluble in that spirit, while those with the other acids are not. All these acids effervesce strongly with alkaline salts, both fixed and volatile; and form with them neutral salts, that is, such as discover no marks either of an acid or alkaline quality.

103. We have already taken notice of two kinds of alkaline salt; the volatile alkali of animals, and the fixed alkali of vegetables. In the mineral kingdom, another species of fixed alkali, different in several respects from the vegetable, is found sometimes in a detached state, but more plentifully in combination with the marine acid, with which it composes sea-salt. From the coalition of the different acids with these three alkalies, and with the several soluble earths and metallic bodies, result a variety of saline compounds, the principal of which will be particularized in the sequel of this treatise.

104. The vitriolic acid, in its concentrated liquid state, is much more ponderous than the other two, emits no visible vapours in the heat of the atmosphere, but imbibes moisture there from, and increases in its weight: the nitrous and marine emit copious corrosive fumes, the nitrous yellowish red, and the marine white ones. If bottles containing the three acids are stopped with cork, the cork is found in a little time tinged black by the vitriolic, corroded into a yellow substance by the nitrous, and into a whitish one by the marine.

105. It is above laid down as a character of one of the classes of earths, that the vitriolic acid precipitates them when they are previously dissolved in any other acid: it is obvious, that on the same principle this particular acid may be distinguished from all others. This character serves not only for the acid in its pure state, but likewise for all its combinations that are soluble in water: if a solution of any compound salt whose acid is the vitriolic, be added to a solution of chalk in any other acid, the vitriolic acid will part from the substance it was before combined with, and join itself to the chalk, forming therewith a compound, which, being no longer dissoluble in the liquor, renders the whole milky for a time, and then gradually subsides.

106. This acid may be distinguished also in compound salts, by another criterion not less strongly marked: if any salt containing it be mixed with powdered charcoal, and the mixture exposed, in a close vessel, to a moderately strong fire, the acid will unite with the directly inflammable part of the charcoal, and compose therewith a genuine sulphur. Common brimstone is no other than a combination of the

vitriolic acid with a small proportion of inflammable matter. With any kind of inflammable matter that is not volatile in close vessels, as the coal of vegetables, of animals, or of bitumens, this acid composes always the same identical sulphur.

107. The nitrous acid also, whatever kind of body it be combined with, is both distinguished and extricated therefrom, by means of any inflammable substance brought to a state of ignition: if the subject be mixed with a little powdered charcoal, and made red-hot, a deflagration or fulmination ensues, that is, a bright flame with a hissing noise; and the inflammable matter and the acid being thus consumed or dissipated together, there remains only the substance that was before combined with the acid, and the small quantity of ashes afforded by the coal.

108. This property of the nitrous acid, deflagrating with inflammable substances, and that of the vitriolic of forming sulphur with them, serve not only as criteria of the respective acids in their various forms and disguises, but likewise for discovering inflammable matter in bodies, when its quantity is too small to be sensible on other trials.

109. If a fixed alkaline salt be united with a vegetable acid, as that of vinegar, into a neutral salt; on adding to this compound some marine acid, the acetous acid will be disengaged, so as to exhale totally in a moderate heat, leaving the marine in possession of the alkali; the addition of the nitrous will in like manner dispossess the marine, which now arises in its proper white fumes, though without such an addition it could not be extricated from the alkali by any degree of heat: on the addition of the vitriolic acid, the nitrous gives way in its turn, exhaling in red fumes, and leaving only the vitriolic acid and the alkali united together.

110. Again, if any metallic body be dissolved in an acid, the addition of any earthy body that is dissoluble in that acid will precipitate the metal: a volatile alkaline salt will in like manner precipitate the earth, and a fixed alkali will dislodge the volatile; which last being readily exhaled by heat, the remaining salt will be the same as if the acid and fixed alkali had been joined together at first, without the intervention of any of the other bodies.

111. The power in bodies, on which these various transpositions and combinations depend, is called by the chemists *affinity*; a term, like the Newtonian *attraction*, designed to express, not the cause, but the effect. When an acid spontaneously quits a metal to unite with an alkali, they say it has a greater affinity to the alkali than to the metal; and when, conversely, they say it has a greater affinity to fixed alkalies than to those of the volatile kind, they mean only that it will unite with the fixed in preference to the volatile, and that, if previously united with a volatile alkali, it will forsake this for a fixed one.

112. The doctrine of the affinities of bodies is of a very extensive use in the chemical pharmacy: many of the official processes, as we shall see hereafter, are founded on it: several of the preparations turn out very different from what would be expected by a person unacquainted with these properties of bodies; and several of them, if, from an error in the process, or other causes, they prove unfit for the use intended, may be

Elements. be rendered applicable to other purposes, by such transpositions of their component parts as are pointed out by the knowledge of their affinities. See CHEMISTRY, n° 64.

C H A P. II.

Of the Pharmaceutical APPARATUS.

117. *Furnaces.* ONE of the principal parts of the pharmaceutical apparatus consists in contrivances for containing and applying fire, and for directing and regulating its power. Of these contrivances, called *furnaces*, there are different kinds, according to the convenience of the place, and the particular purposes they are intended to answer. See the article FURNACE; and CHEMISTRY, n° 98, 99, 101, 102.

118. The most simple pharmaceutical furnace is the common stove, otherwise called the *furnace for open fire*. This is usually made of an iron hoop, five or six inches deep; with a grate or some iron-bars across the bottom, for supporting the fuel. It either stands upon feet, so as to be moveable from place to place, or is fixed in brick-work. In this last case, a cavity is left under the grate for receiving the ashes that drop thro' it; and an aperture or door, in the fore-part of this ash-pit, serves both for allowing the ashes to be occasionally raked out, and for admitting air to pass up through the fuel. This furnace is designed for such operations as require only a moderate heat; as infusion, decoction, and the evaporation of liquids. The vessel containing the subject-matter is supported over the fire by a trevet.

119. A deeper hoop or body, cylindrical, parallelipedal, widening upwards, elliptical, or of other figures; formed of, or lined with, such materials as are capable of sustaining a strong fire, with a grate and ash-pit beneath, as in the preceding, and communicating at the top with a perpendicular pipe, or chimney, makes a wind-furnace.

120. The greater the perpendicular height of the chimney, the greater will be the draught of air thro' the furnace, and the more intensely will the fire burn; provided the width of the chimney is sufficient to allow a free passage to all the air that the furnace can receive thro' the grate: for which purpose, the area of the aperture of the chimney should be nearly equal to the area of the interstices of the grate.

121. Hence, where the chimney consists of moveable pipes, made to fit upon one another at the ends, so that the length can be occasionally increased or diminished, the vehemence of the fire will be increased or diminished in the same proportion.

122. In furnaces whose chimney is fixed, the same advantage may be procured on another principle. As the intensity of the fire depends wholly upon the quantity of air successively passing through and animating the burning fuel, it is obvious, that the most vehement fire may be suppressed or restrained at pleasure, by more or less closing either the ash-pit door by which the air is admitted, or the chimney by which it passes off; and that the fire may be more or less raised again, by more or less opening those passages. A moveable plate or register, in any convenient part of the chimney, affords commodious means of varying the width of the passage, and consequently of regulating the heat.

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123. There are two general kinds of these wind-furnaces; one, with the chimney on the top, over the middle of the furnace; the other with the chimney on one side, and the mouth clear.

124. In the first, either the upper part of the furnace is contracted to such an aperture, that the chimney may fit upon it; or it is covered with an arched dome, or with a flat plate, having a like aperture in the middle. As in this disposition of the chimney, the inside of the furnace cannot be come at from above; a door is made in the side, a little above the grate, for supplying fuel, inspecting the matter in the fire, &c.

125. For performing fusions in this furnace, the crucible, or melting vessel, is placed immediately among the fuel; with a slip of brick, or some other like support, between it and the grate, to keep the cold air, which enters underneath, from striking on its bottom.

126. When designed as a reverberatory, that is, for distillation in long necks or coated glass-retorts, two iron bars are placed across, above the fire, for supporting the vessel, whose neck comes out at an aperture made for that purpose in the side. This aperture should be made in the side opposite to that in which is the door above-mentioned, or at least so remote from it, that the receiver, fitted on the neck of the distilling vessel without the furnace, may not lie in the operator's way when he wants to stir the fire or throw in fresh fuel.

127. The other kind of wind-furnace communicates, by an aperture in its back-part near the top, either with an upright pipe of its own, or with the chimney of the room; in which last case, all other passages into the chimney must be closed up. Here the mouth of the furnace serves for a door, which may be occasionally covered with a plate or tile. Of this kind is the furnace most commonly used for fusion in a crucible.

151. *Vessels.* Of these and other pharmaceutical instruments the principal will be mentioned in the following chapter, in speaking of the several operations to which they are respectively subservient.

152. *Weights.* Two different kinds of weights are made use of in this country; one in the merchandize of gold and silver; the other for almost all goods besides. The first we call *Troy*, the latter *Averdupois weight*.

153. The goldsmiths divide the Troy pound into 12 ounces; the ounce into 20 penny-weights; and the penny-weight into 24 grains. The Averdupois pound is divided into 16 ounces; and the ounce into 16 parts, called *drams*.

The pound of the London and Edinburgh dispensaries (which is the only one made use of in this article) is that of the goldsmiths, divided in the following manner:

The Pound	} contains	twelve Ounces.
The Ounce		eight Drams.
The Dram		three Scruples.
The Scruple		twenty Grains.

The grain is equal to the goldsmiths grain.

154. The medical or Troy pound is less than the averdupois, but the ounce and the dram greater. The Troy pound contains 5760 grains; the averdupois 7000 grains. The Troy ounce contains 480 grains; the averdupois only 437½. The Troy dram 60; the averdupois dram somewhat more than 27. Eleven drams averdupois are equal to five drams Troy; 12 ounces

33 Y averdupois

Elements. averdupois to nearly 11 ounces Troy; and 19 pounds averdupois to somewhat more than 23 pounds Troy.

155. These differences in our weights have occasioned great confusion in the practice of Pharmacy. As the druggists and grocers sell by the averdupois weight, the apothecaries have not in general kept any weights adjusted to the Troy pound greater than two drams, using for all above averdupoise. By this means it is apparent, that in all compositions, where the ingredients are prescribed, some by pounds and others by ounces, they are taken in a wrong proportion to each other; and the same happens when any are directed in lesser denominations than the ounce, as these subdivisions used by the apothecaries are made to a different ounce. The mercurial plaster of the late Pharmacopœia, and the mercurial cerate of the present, if compounded by the averdupoise weight, contain about one sixth less quicksilver than if made, as they ought to be, by the Troy. This error prevailed so far as to be received in some former editions of the London Pharmacopœia itself; but is now happily removed.

156. *Measures.* The measures employed with us in pharmacy are the common wine-measures.

A Gallon } contains { eight Pints (*libra*).
The Pint } { sixteen Ounces.
The Ounce } { eight Drams.

157. By a spoonful, in the London dispensatory, is understood, the measure of half an ounce; in the Edinburgh, half an ounce weight in syrups, and three drams in distilled waters.

158. Though the pint is called by Latin writers *libra* or "pound," there is not any known liquor of which a pint-measure answers to that weight. A pint of the highest rectified spirit of wine exceeds a pound by above half an ounce; a pint of water exceeds it by upwards of three ounces; and a pint of oil of vitriol weighs more than two pounds and a quarter.

159. A table of the weights of certain measures of different fluids may on many occasions be useful, both for assisting the operator in regulating their proportions in certain cases, and for shewing the comparative gravities of the fluids themselves. Dr Lewis has drawn up such a table for a pint, an ounce, and a dram measure of those liquids, whose gravity has been determined by experiments that can be relied on. The wine-gallon contains 231 cubic inches; whence the pint contains $28\frac{1}{2}$; the ounce $1\frac{17}{32}$; and the dram $\frac{1}{16}$ of a cubic inch.

	Pint weights			Ounce measure weights		Dram measure weights	
	ounces	drams	grains	grains	grains	grains	grains
INFLAMMABLE SPIRITS.							
Æthereal spirit of wine	11	1	36	336		42	
Highly-rectified spirit of wine	12	5	20	380		47½	
Common-rectified spirit of wine	13	2	40	400		50	
Proof-spirit	14	1	36	426		53	
Dulcified spirit of salt	14	4	48	438		55	
Dulcified spirit of nitre	15	2	40	460		57½	
WINES.							
Burgundy	14	1	36	426		53	
Red port	15	1	36	456		57	
Canary	15	6	40	475		59½	

EXPRESSED OILS.

Oil-olive - - -
Lined oil - - -

ESSENTIAL OILS.

Oil of turpentine -
of orange-peel -
of juniper-berries -
of rosemary -
of origanum -
of caraway-seeds -
of nutmegs -
of favin -
of hyssop -
of cummin-seed -
of mint -
of pennyroyal -
of dill-seed -
of fennel-seed -
of cloves -
of cinnamon -
of saffras -

ALKALINE LIQUORS.

Lixiv. faponarium, *Phar. Lond.*
Spirit of sal ammoniac -
Strong soap-boilers ley
Lixivium tartari

ACID LIQUORS.

Wine-vinegar - -
Beer-vinegar - -
Glauber's spirit of salt
Glauber's spirit of nitre
Strong oil of vitriol

ANIMAL-FLUIDS.

Urine - - -
Cows milk - - -
Asses milk - - -
Blood - - -

WATERS.

Distilled water - -
Rain-water - - -
Spring-water - - -
Sea-water - - -

QUICKSILVER.

	Pint weights		Ounce measure weights		Dram measure weights		Elements.
	ounces	drams	ounces	grains	drams	grains	
Oil-olive	14	0	0	420	52½		
Lined oil	14	2	8	428	53½		
Oil of turpentine	12	1	4	364	45½		
of orange-peel				408	51		
of juniper-berries				419	52		
of rosemary				430	54		
of origanum				432	54		
of caraway-seeds				432	54		
of nutmegs				436	54½		
of favin				443	55½		
of hyssop				443	55½		
of cummin-seed				448	56		
of mint				448	56		
of pennyroyal				450	56½		
of dill-seed				457	57		
of fennel-seed				458	57		
of cloves				476	59½		
of cinnamon				476	59½		
of saffras				503	63		
Lixiv. faponarium, <i>Phar. Lond.</i>	16	0	0	480	60		
Spirit of sal ammoniac	17	1	10	545	64½		
Strong soap-boilers ley	17	6	24	534	67		
Lixivium tartari	24	0	0	720	90		
Wine-vinegar	15	3	44	464	58		
Beer-vinegar	15	6	56	476	59½		
Glauber's spirit of salt	17	4	0	525	65½		
Glauber's spirit of nitre	20	2	40	610	76		
Strong oil of vitriol	28	5	20	860	107½		
Urine	15	5	20	470	59		
Cows milk	15	6	40	475	59½		
Asses milk	16	0	0	480	60		
Blood	16	1	4	484	60½		
Distilled water	15	1	50	456	57		
Rain-water	15	2	40	460	57½		
Spring-water	15	3	12	462	58		
Sea-water	15	5	20	470	59		
QUICKSILVER.	214	5	20	6440	805		

C H A P. III.

Of the Pharmaceutical OPERATIONS.

SECT. I. *Solution.*

160. **SOLUTION** is an intimate commixture of solid bodies with fluids into one seemingly homogeneous liquor. The dissolving fluid is called a *Menstruum* or *Solvent*.

161. The principal menstrua made use of in pharmacy, are water, vinous spirits, oils, acid and alkaline liquors.

162. Water is the menstruum of all salts, of vegetable gums, and of animal-gellics. Of salts it dissolves only a determinate quantity, though of one kind of salt more than another; and being thus saturated, leaves any additional quantity of the same salt untouched.

163. Experiments have been made for determining the

Elements. the quantities of water which different salts require for their dissolution: Mr Eller has given a large set in the Memoirs of the royal academy of sciences of Berlin for the year 1750, from which the following table is extracted.

Eight ounces by weight of distilled water dissolved

	oz.	dr.	gr.
Of refined sugar	24	0	0
Green vitriol	9	4	0
Blue vitriol	9	0	0
White vitriol	4	4	0
Epsom salt	4	0	0
Purified nitre	4	0	0
Soluble tartar	4	0	0
Common salt	3	4	0
Sal gemmæ	3	4	0
Sal catharticus Glauberi	3	4	0
Seignette's salt	3	0	0
Alum	2	4	0
Sal ammoniac	1	4	0
Vitriolated tartar	1	4	0
Salt of hartshorn	1	4	0
Sugar of lead	1	2	0
Cream of tartar	1	0	0
Borax	0	4	20

164. Though great care appears to have been taken in making these experiments, it is not to be expected, that the proportions of the several salts, soluble in a certain quantity of water, will always be found exactly the same with those above set down. Salts differ in their solubility according to the degree of their purity, perfection, and driness: the vitriols, and the artificial compound salts in general, differ remarkably in this respect, according as they are more or less impregnated with the acid ingredient. Thus vitriolated tartar, perfectly neutralized, is extremely difficult of solution: the matter which remains in making Glauber's spirit of nitre, is no other than a vitriolated tartar; and it dissolves so difficultly, that the operator is obliged to break the retort in order to get it out; but on adding more of the vitriolic acid, it dissolves with ease. Hence many have been tempted to use an over-proportion of acid in this preparation; and we frequently find in the shops, under the name of *vitriolated tartar*, this acid soluble salt. The degree of heat occasions also a notable difference in the quantity of salt taken up: in very cold weather, eight ounces of water will dissolve only about one ounce of nitre; whereas, in warm weather, the same quantity will take up three ounces or more. To these circumstances are probably owing, in great part, the remarkable differences in the proportional solubilities of salt, as determined by different authors: it is observable, that common salt is less affected in its solubility, by a variation of heat, than any other, water in a temperate state dissolving nearly as much of it as very hot water; and accordingly this is the salt in which the different experiments agree the best. In the experiments of Hoffmann, Neumann, and Petit, the proportion of this salt, on a reduction of the numbers, comes out exactly the same, viz. three ounces of the salt to eight of water: Dr Brownrigg makes the quantity of salt a little more; Dr Grew, a dram and a scruple more;

and Eller, as appears in the above table, four drams more: so that in the trial of six different persons, made probably in different circumstances, the greatest difference is only one-sixth of the whole quantity of salt; whereas in some other salts there are differences of twice or thrice the quantity of the salt. In the experiments from which the table is drawn, the water was of the temperature of between 40 and 42 degrees of Fahrenheit's thermometer, or above freezing by about one-seventh of the interval between freezing and the human heat.

165. Some salts omitted by Eller are here subjoined: the first is taken from Dr Grew, and the other four from Neumann.

Eight ounces of water dissolved

	dr.	scr.	gr.
Of fixed alkaline salt	8	0	0
Sal diuretics	8	0	0
Sugar-candy, both brown and white	9	0	0
Sugar of milk	0	2	40
Essential salt of ferrel	0	1	20

166. Though water takes up only a certain quantity of one kind of salt, yet when saturated with one, it will still dissolve some portion of another; and when it can bear no more of either of these, it will still take up a third, without letting go any of the former. The principal experiments of this kind that have been made relative to pharmaceutic subjects, are exhibited in the following table, of which the two first articles are from Grew, and the others from Eller.

Water, 32 parts by weight

fully saturated with	dissolved afterwards
Nitre	Sal ammoniac 10
Common salt	Nitre 10
Nitre	Fixed alkali 7
Common salt	Nitre, near 2
Volatile alkali	Nitre 4
Sal ammoniac	Common salt 2½
Soluble tartar	Nitre 2
Vitriolated tartar	Fixed alkali 2
Glauber's salt	Nitre 1
Epsom salt	Sugar 6
Borax	Fixed alkali 2

167. In regard to the other class of bodies which water is a menstruum for, viz. those of the gummy and gelatinous kind, there is no determinate point of saturation: the water unites readily with any proportions of them, forming with different quantities liquors of different consistences. This fluid takes up likewise, when assisted by trituration, the vegetable gummy resins, as ammoniacum and myrrh; the solutions of which, though imperfect, that is, not transparent, but turbid and of a milky hue, are nevertheless applicable to valuable purposes in medicine. It mingles with vinous spirits, with acid and alkaline liquors, not with oils; but imbibes some of the more subtle parts of essential oils, so as to become impregnated with their smell and taste.

168. Rectified spirit of wine is the menstruum of the essential oils, resins and camphor of vegetables; of the pure distilled oils, and several of the colouring and medicinal parts of animals; of some mineral bi-

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tumorous substances, as of ambergris: and of soaps, though it does not act upon the expressed oil and fixed alkaline salt of which soap is compounded; whence, if soap contains any superfluous quantity of either the oil or salt, it may, by means of this menstruum, be excellently purified therefrom. It dissolves, by the assistance of heat, volatile alkaline salts; and, more readily, the neutral ones, composed either of fixed alkali and the acetic acid, as the sal diureticus, or of volatile alkali and the nitrous acid, as also the salt of amber, &c. It mingles with water and with acids; not with alkaline lixivia.

169. Oils dissolve vegetable resins and balsams, wax, animal-fat, mineral bitumens, sulphur, and certain metallic substances, particularly lead. The expressed oils are, for most of these bodies, more powerful menstrua than those obtained by distillation; as the former are more capable of sustaining, without injury, a strong heat, which is, in most cases, necessary to enable them to act. It is said, that one ounce of sulphur will dissolve in three ounces of expressed oil, particularly that of linseed; but requires six ounces of essential oil, as that of turpentine.

170. All acids dissolve alkaline salts, alkaline earths, and metallic substances. The different acids differ greatly in the action upon these last; one dissolving only some particular metals; and another, others.

171. The vegetable acids dissolve a considerable quantity of zinc, iron, copper, lead, and tin; and extract so much from the metallic part of antimony, as to become powerfully emetic: they dissolve lead more readily, if the metal is previously calcined by fire, than in its metallic state.

172. The marine acid dissolves zinc, iron, and copper; and though it scarce acts on any other metallic substance in the common way of making solutions, it may nevertheless be artfully combined with them all except gold: the corrosive sublimate, and antimonial caustic of the shops, are combinations of it with mercury and the metallic part of antimony, effected by applying the acid, in the form of fume, to the subjects, at the same time also strongly heated.

173. The nitrous acid is the common menstruum of all metallic substances, except gold and the metallic part of antimony; of which two, the proper solvent is a mixture of the nitrous and marine acids called *aqua regia*.

174. The vitriolic acid, diluted with water, easily dissolves zinc and iron: in its concentrated state, and assisted by a boiling heat, it may be made to corrode, or imperfectly dissolve, most of the other metals.

175. Alkaline lixivia dissolve oils, resinous substances, and sulphur. Their power is greatly promoted by the addition of quicklime; instances of which occur in the preparation of soap, and in the common caustic. Thus acuated, they reduce the flesh, bones, and other solid parts of animals, into a gelatinous matter.

176. Solutions made in water, and in spirit of wine, possess the virtues of the body dissolved; whilst oils generally theate its activity, and acids and alkalies vary its quality. Hence watery and spirituous liquors are the proper menstrua of the native virtues of vegetable and animal matters.

177. Most of the foregoing solutions are easily effected, by pouring the menstruum on the body to be dissolved, and suffering them to stand together, for

some time, exposed to a suitable warmth. A strong heat is generally requisite to enable oils and alkaline liquors to perform their office: nor will acids act on some metallic bodies without its assistance. The action of watery and spirituous menstrua is likewise expedited by a moderate heat; though the quantity which they afterwards keep dissolved is not, as some suppose, by this means increased: all that heat occasions these to take up more than they would do in a longer time in the cold, will, when the heat ceases, subside again: this at least is most commonly the case, though there may be some instances of the contrary.

178. The action of acids on the bodies which they dissolve, is generally accompanied with heat, effervescence, and a copious discharge of fumes. The fumes which arise during the dissolution of some metals in the vitriolic acid, prove inflammable: hence in the preparation of the artificial vitriols of iron and zinc, the operator ought to be careful, especially where the solution is made in a narrow-mouthed vessel; lest, by the imprudent approach of a candle, the exhaling vapour be set on fire.

179. There is another species of solution, in which the moisture of the air is the menstruum. Fixed alkaline salts, and those of the neutral kind, composed of alkaline salts and the vegetable acids, or of soluble earths and any acid except the vitriolic, and some metallic salts, on being exposed for some time to a moist air, gradually attract its humidity, and at length become liquid. Some substances, not dissoluble by the application of water in its grosser form, as the butter of antimony, are easily liquefied by this slow action of the aerial moisture. This process is termed *Deli- quation*.

SECT. II. *Extraction*.

180. The liquors which dissolve certain substances in their pure state, serve likewise to extract them from admixtures of other matter. Thus rectified spirit of wine, the menstruum of essential oils and resins, takes up the virtues of the resinous and oily vegetables; as water does those of the mucilaginous and saline; the inactive earthy parts remaining untouched by both. Water extracts likewise from many plants substances which by themselves it has little effect upon; even essential oils being, as we have formerly observed, rendered soluble in that fluid, by the admixture of gummy and saline matter, of which all vegetables participate in a greater or less degree. Thus many of the aromatic plants, and most of the bitters and astringents, yield their virtues to this menstruum.

181. Extraction is performed by *macerating* or steeping the subject in its appropriated menstruum in the cold, or *digesting* or *circulating* them in a moderate warmth; or *infusing* the plant in the boiling liquor, and suffering them to stand in a covered vessel till grown cold; or actually *boiling* them together for some time.

182. The term *digestion* is sometimes used for maceration; and in this case the process is directed to be performed without heat: where this circumstance is not expressed, digestion always implies the use of heat. Circulation differs from digestion only in this, that the steam, into which a part of the liquor is resolved by the heat, is, by means of a proper disposition of the vessels,

vessels, condensed and conveyed back again upon the subject. Digestion is usually performed in a *matrafi*, (or *bolthead*), Florence flask, or the like; either of which may be converted into a circulatory vessel, by inverting another into the mouth, and securing the juncture with a piece of wet bladder. A single *matrafi*, if its neck is very long and narrow, will answer the purpose as effectually, the vapour cooling and condensing before it can rise to the top. In a vessel of this kind, even spirit of wine, one of the most volatile liquors we know of, may be boiled without any considerable loss. The use of this instrument is likewise free from an inconvenience which may, in some cases, attend the other, of the uppermost vessel being burnt or thrown off. As the long-necked *matrafics* here recommended are difficultly filled or emptied, and likewise very dear, a long glass-pipe may be occasionally luted to the shorter ones.

183. Heat greatly expedites extraction; but by this means proves as injurious to some substances, by occasioning the menstruum to take up their grosser and more ungrateful parts, as it is necessary for enabling it to extract the virtues of others. Thus guaiacum or logwood impart little to aqueous liquors without a boiling heat, whilst even a small degree of warmth proves greatly prejudicial to the fine bitter of *carduus benedictus*. This plant, which, infused in boiling, or digested in sensibly hot water, gives out a nauseous taste, so offensive to the stomach as to promote vomiting, yields to the cold element a grateful balsamic bitter, the most elegant stomachic of the shops.

184. As heat promotes the dissolving power of liquids; so cold, on the other hand, diminishes it. Hence tinctures, or extractions made by a considerable heat, deposit in cold weather a part of their contents, and thus become proportionably weaker; a circumstance which deserves particular regard.

SECT. III. *Depuration.*

185. There are different methods of depurating or purifying liquors from their feculences, according as the liquor itself is more or less tenacious, or the feculent matter of greater or less gravity.

186. Thin fluids readily deposit their more ponderous impurities upon standing at rest for some time in a cool place: and may then be *decanted*, or poured off clear, by inclining the vessel.

187. Glutinous, unctuous, or thick substances, are to be liquified by a suitable heat; when the grosser feculencies will fall to the bottom, the lighter arising to the surface, to be *despumated* or scummed off.

188, 189. Where the impurities are neither so ponderous as to subside freely to the bottom, nor so light as to arise readily to the surface, they may be separated in great measure by *colature* through strainers of linen, woollen, or other cloth, and more perfectly by *filtration* through a soft bibulous kind of paper made for this use.

190. Glutinous and unctuous liquors, which do not easily pass through the pores of a filter or strainer, are *clarified* by beating them up with whites of eggs; which concreting or growing hard when heated, and entangling the impure matter, arise with it to the surface. The mixture is to be gently boiled till the scum begins to break, when the vessel is to be removed from

the fire, the cruft taken off, and the liquor passed through a flannel-bag.

191. Decantation, colature, and filtration, are applicable to most of the medicated liquors that stand in need of purification. Despumation and clarification very rarely have place; since these, along with the impurities of the liquor, frequently separate its medicinal parts. Thus, if the decoction of poppy-heads for making diacodium be solicitously scummed or clarified, (as some have been accustomed to do), the medicine will lose almost all that the poppies communicated, and instead of a mild opiate, turn out little other than a plain syrup of sugar.

192. It may be proper to observe, that the common sorts of filtering-paper are apt to communicate a disagreeable flavour: and hence, in filtering fine bitters, or other liquors whose gratefulness is of primary consequence, the part which passes through first ought to be kept apart for inferior purposes.

SECT. IV. *Crystallization.*

193.—197. Water, assisted by heat, dissolves a larger proportion of saline substances than it can retain when grown cold. Hence, on the abatement of the heat, a part of the salt separates from the menstruum, and concretes at the sides and bottom of the vessel. These concretions, unless too hastily formed by the sudden cooling of the liquor, or disturbed in their coalescence by agitation or other like causes, prove transparent, and of regular figures, resembling in appearance the natural sprig-crystals.

198. Different salts require different quantities of water to keep them dissolved: and hence if a mixture of two or more be dissolved in this fluid, they will begin to separate and crystallize at different periods of the evaporation. Upon this foundation salts are freed not only from such impurities as water is not capable of dissolving and carrying through the pores of a filter, but likewise from admixtures of one another; that which requires most water to dissolve in shooting first into crystals.

SECT. V. *Precipitation.*

199. By this operation, bodies are recovered from their solutions by means of the addition of some other substance, with which either the menstruum, or the body dissolved, have a greater affinity than they have with one another.

200, 201. Precipitation, therefore, is of two kinds; one where the substance superadded unites with the menstruum, and occasions that before dissolved to be thrown down; the other, in which it unites with the dissolved body, and falls along with it to the bottom. Of the first we have an example in the precipitation of sulphur from alkaline lixivium by the means of the acid; of the second, in the precipitation of mercury from aquafortis by sea-salt or its acid.

189. Where metals are employed as precipitants, as in the purification of martial vitriol from copper, by the addition of fresh iron, they ought to be perfectly clean and free from any rusty or greasy matter: otherwise they will not readily, if at all, dissolve, and consequently the precipitation will not succeed; for the substance to be precipitated separates only by the additional one dissolving and taking its place. The

separated

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separated powder oftentimes, instead of falling to the bottom, lodges upon the precipitant; from which it must be occasionally shaken off, for reasons sufficiently obvious.

203. Though in this operation the precipitated powder is generally the part required for use, yet some advantage may frequently be made of the liquor remaining after the precipitation. Thus when fixed alkaline salt is dissolved in water, and sulphur dissolved in this *lixivium*, the addition of acids separates and throws down the sulphur, only in virtue of the acid uniting with and neutralizing the alkali by which the sulphur was held dissolved; consequently, if the precipitation is made with the vitriolic acid, and the acid gradually dropped in till the alkali is completely fatigued, that is, so long as it continues to occasion any precipitation or turbidness, the liquor will yield, by proper evaporation and crystallization, a neutral salt, composed of the vitriolic acid and fixed alkali, that is, vitriolated tartar. In like manner, if the precipitation is made with the nitrous acid, a true nitre may be recovered from the liquor; if with the marine, the salt called *spiritus salis marini coagulatus*; and if with the acid of vinegar, the *sal diureticus*.

SECT. VI. Evaporation.

204. This is a third method of recovering solid bodies from their solutions, effected by the means of heat; which evaporating the fluid part, that is, forcing it off in steam, the matter which was dissolved therein is left behind in its solid form.

205. This process is applicable to the solutions of all those substances which are less volatile than the menstruum, or which will not exhale by the heat requisite for the evaporation of the fluid; as the solutions of fixed alkaline salts, of the gummy, gelatinous, and other inodorous parts of vegetables and animals in water, and of many resinous and odorous substances in spirit of wine.

206. Water extracts the virtues of sundry fragrant aromatic herbs almost as perfectly as rectified spirit of wine: but the aqueous infusions are far from being equally suited to this process with those made in spirit; water carrying off the whole odour and flavour of the subject, which that lighter liquor leaves entire behind it. Thus a watery infusion of mint loses in evaporation the smell, taste, and virtues of the herb; whilst a tincture drawn with pure spirit yields, on the same treatment, a thick balsamic liquid, or solid gummy resin, extremely rich in the peculiar qualities of the mint.

207. In evaporating these kinds of liquors, particular care must be had, towards the end of the process, that the heat be very gentle; otherwise the matter as it grows thick will burn to the vessel, and contract a disagreeable smell and taste: this burnt flavour is called an *empyreuma*. The liquor ought to be kept stirring during the evaporation; otherwise a part of the matter concretes on the surface exposed to the air, and forms a pellicle which impedes the farther evaporation.

SECT. VII. Distillation.

208. In the foregoing operation, fluids are rarefied

by heat into steam or vapour, which is suffered to exhale in the air, but which the business of this is to collect and preserve. For this purpose the steam is received in proper vessels, luted to that in which the subject is contained; and being there cooled, condenses into a fluid form again.

209. There are two kinds of distillation: by the one, the more subtle and volatile parts of liquors are elevated from the grosser; by the other, liquids, incorporated with solid bodies, are forced out from them by vehemence of fire.

210. To the first belongs the distillation of the pure inflammable spirit from vinous liquors, and of such of the active parts of vegetables as are capable of being extracted by boiling water or spirit, and at the same time of arising along with their steam.

211. As boiling water extracts or dissolves the essential oils of vegetables whilst blended with the other principles of the subject without saturation, but imbibes only a determinate, and that a small, portion of them in their pure state; as these oils are the only substances contained in common vegetables, which prove totally volatile in that degree of heat; and as it is in them that the virtues of aromatics, and the peculiar odour and flavour of all plants, reside; it is evident that water may be impregnated, by distillation, with the more valuable parts of many vegetables: that this impregnation is limited, the oil arising in this process pure from those parts of the plant which before rendered it soluble in water without limitation; hence the greater part of the oil separates from the distilled aqueous liquor, and, according to its greater or less gravity, either sinks to the bottom or swims on the surface: that consequently infusions and distilled waters are greatly different from one another: that the first may be rendered stronger and stronger by pouring the liquor on fresh parcels of the subject; but that the latter cannot be in like manner improved by *cobobating*, or redistilling them from fresh ingredients.

212. As the oils of many vegetables do not freely distil with a less heat than that in which water boils, as rectified spirit of wine is not susceptible of this degree of heat, and as this menstruum totally dissolves these oils in their pure state; it follows, that spirit elevates far less from most vegetables than water; but that nevertheless the distilled spirit, by keeping all that it does elevate perfectly dissolved, may, in some cases, prove as strong of the subject as the distilled water.

213. The apparatus made use of for distilling spirits, waters, and oils, consists of a *still*, or copper vessel, for containing the subject, on which is luted a large head with a *swan neck*. The vapour arising into the head, is thence conveyed through a *worm*, or long spiral pipe, placed in a vessel of cold water called a *refrigeratory*; and being there condensed, runs down into a receiver.

214. It may be observed, that as the parts which are preserved in evaporation cannot arise in distillation, the liquor remaining after the distillation, properly depurated and inspissated, will yield the same extracts as those prepared from the tincture or decoction of the subject made on purpose for that use: the oil of these operations collecting only the volatile parts, and the

the other the more fixed; so that where one subject contains medicinal parts of both kinds, they may thus be obtained distinct, without one being injured by the process which collects the other.

215, 216, 217. The subjects of the second kind of distillation are, the gross oils of vegetables and animals, the mineral acid spirits, and the metallic fluid quicksilver; which as they require a much stronger degree of heat to elevate them than the foregoing liquors can sustain, so they likewise condense without arising so far from the action of the fire. The distillation of these is performed in low glass-vessels, called, from their neck being bent to one side, *retorts*: to the farther end of the neck a *receiver* is luted, which standing without the furnace, the vapours soon condense in it, without the use of a refrigeratory: nevertheless, to promote this effect, some are accustomed, especially in warm weather, to cool the receiver, by occasionally applying wet cloths to it, or keeping it partly immersed in a vessel of cold water.

SECT. VIII. Sublimation.

218. As all fluids are volatile by heat, and consequently capable of being separated, in most cases, from fixed matters by the foregoing process; so various solid bodies are subjected to a similar treatment. Fluids are said to *distil*, and solids to *sublime*; though sometimes both are obtained in one and the same operation. If the subliming matter concretes into a mass, it is commonly called a *sublimate*; if into a powdery form, *flowers*.

219. The principal subjects of this operation are, volatile alkaline salts; neutral salts, composed of volatile alkalis and acids, as sal ammoniac; the salt of amber, and flowers of benzoin; mercurial preparations; and sulphur. Bodies of themselves not volatile are frequently made to sublime by the mixture of volatile ones: thus iron is carried up by sal ammoniac in the preparation of the *fores martiales*.

220. The fumes of solid bodies in close vessels rise but little way, and adhere to that part of the vessel where they concrete. Hence a receiver or condenser is less necessary here than in the preceding operation; a single vessel, as a matras, or tall vial, or the like, being frequently sufficient. The most commodious apparatus for the sublimation of particular substances, and the most advantageous method of conducting the several processes, will be afterwards delivered.

SECT. IX. Expression.

221. The *press* is chiefly made use of for forcing out the juices of succulent herbs and fruits, and the insipid oils of the unctuous seeds and kernels.

222. The harder fruits, as quinces, require to be previously well beat or ground; but herbs are to be only moderately bruised. The subject is then included in a hair-bag, and pressed betwixt wooden plates, in the common screw-press, as long as any juice runs from it.

223. The expression of oils is performed nearly in the same manner as that of juices; only here, iron plates are substituted to the wooden ones there made use of. The subject is well pounded, and included in a strong canvas-bag, betwixt which and the plates of the press a hair-cloth is interposed.

224. The insipid oils of all the unctuous seeds are obtained, uninjured, by this operation, if performed without the use of heat, which though it greatly promotes the extraction of the oil, at the same time imparts an ungrateful flavour, and increases its disposition to grow rancid.

225. The oils expressed from aromatic substances generally carry with them a portion of their essential oil: hence the smell and flavour of the expressed oils of nutmegs and mace. They are very rarely found impregnated with any of the other qualities of the subject: oil of mustard-seed, for instance, is as soft and void of acrimony as that of almonds, the pungency of the mustard remaining entire in the cake left after the expression.

SECT. X. Exsiccation.

226. THERE are two general methods of *exsiccating* or drying moist-bodies: in one, their humid parts are exhale by heat; in the other, they are imbibed or absorbed by substances whose soft and spongy texture adapts them to that use. Bodies intimately combined with or dissolved in a fluid, as recent vegetables and their juices, require the first; such as are only superficially mixed, as when earthy or indissoluble powders are ground with water, are commodiously separated from it by the second.

227. Vegetables and their parts are usually exsiccated by the natural warmth of the air; the assistance of a gentle artificial heat may, nevertheless, in general, be not only safely, but advantageously had recourse to. By a moderate fire, even the more tender flowers may be dried in a little time, without any loss either of their odour or lively colour; which would both be greatly injured or destroyed by a more slow exsiccation in the air. Some plants indeed, particularly those of the acrid kind, as horie-radish, scurvy grass, and arum, lose their virtues by this process, however carefully performed; but far the greater number retain them unimpaired, and oftentimes improved.

228. The thicker vegetable juices may be exsiccated by the heat of the sun; or, where this is not sufficient, by that of a water-bath, or an oven moderately warm. The thinner juices may be gently boiled till they begin to thicken, and then treated as the foregoing: this process, termed *inspissation* or *evaporation*, has been spoken of already. The juices of some plants, as arum-root, briony-root, orris-root, wild cucumbers, &c. separate, upon standing for some time, into a thick part which falls to the bottom, and a thin aqueous one which swims above it: this last is to be poured off, and the first exsiccated by a gentle warmth: preparations of this kind have been usually called *sculæ*; that of the wild cucumber, is the only one which practice now retains.

229. Indissoluble bodies mixed with water into a thick consistence, may be easily freed from the greatest part of it, by dropping them on a chalk-stone, or some powdered chalk pressed into a smooth mass, which readily imbibes their humidity. Where the quantity of fluid is large, as in the elucoration of precipitates, it may be separated by decantation or filtration.

SECT. XI. Comminution.

230. COMMINATION is the bare reduction of solid coherent

Elements. coherent bodies into small particles or powder. The methods of effecting this are various, according to the texture of the subject.

231. Dry friable bodies, or such as are brittle and not very hard, and mixtures of these with somewhat moist ones, are easily *pulverized* in a mortar.

232. For very light dry substances, resins, and the roots of a tenacious texture, the mortar may in some cases be previously rubbed with a little sweet oil, or a few drops of oil be occasionally added: this prevents the finer powder of the dirt from flying off, and the others from cohering under the pestle. Camphor is most commodiously powdered, by rubbing it with a little rectified spirit of wine.

233. Tough substances, as woods, the peels of oranges and lemons, &c. are most conveniently *rasped*; and soft oily bodies, as nutmegs, passed through a *grater*.

234. The comminution of the harder minerals, as calamine, crystal, flint, &c. is greatly facilitated by *extinction*; that is, by heating them red hot, and quenching them in water: by repeating this process a few times, most of the hard stones becomes easily pulverable. This process, however, is not to be applied to any of the alkaline or calcareous stones; lest, instead of an insipid powder, we produce an acrimonious calx or lime.

235. Some metals, as tin, though strongly cohering in their natural state, prove extremely brittle when heated, inasmuch as to be easily divided into small particles by dextrous agitation. Hence the official method of pulverising tin, by melting it, and, at the instant of its beginning to return into a state of solidity, briskly shaking it in a wooden box. The comminution of metals in this manner is termed by the metallurgists *granulation*.

236. On a similar principle, certain salts, as nitre, may be reduced into powder in large quantity, by dissolving them in boiling water, setting the solution over a moderate fire, and keeping the salt constantly stirring during its exsiccation, so as to prevent its particles, disjoined by the fluid, from re-uniting together into larger masses.

237. Powders are reduced to a great degree of fineness by *trituration* or rubbing them for a length of time in a mortar. Such as are not dissoluble in water, or injured by the admixture of that fluid, are moistened with it into the consistence of a paste, and *levigated* or ground on a flat smooth marble or iron plate; or where a large quantity is to be prepared at times, in mills made for that use.

238. Comminution, though one of the most simple operations of pharmacy, has, in many cases, very considerable effects. The resinous purgatives, when finely triturated, are more easily soluble in the animal fluids, and consequently prove more cathartic and less irritating than in their grosser state. Crude antimony, which when reduced to a tolerably fine powder discovers little medicinal virtue, if levigated to a great degree of subtlety, proves a powerful alterative in many chronic disorders.

239. By comminution, the heaviest bodies may be made to float in the lightest fluids, for a longer or shorter time, according to their greater or less degree of tenacity. Hence we are furnished with an excellent

criterion of the fineness of certain powders, and a method of separating the more subtle parts from the grosser, distinguished by the name of *elutriation*, or *washing over*. See 275, &c.

SECT. XII. Fusion.

240. Fusion is the reduction of solid bodies into a state of fluidity by fire. Almost all natural substances, the pure earths and the solid parts of animals and vegetables excepted, melt in proper degrees of fire; some in a very gentle heat, whilst others require its utmost violence.

241. Turpentine, and other soft resinous substances, liquify in a gentle warmth; wax, pitch, sulphur, and the mineral bitumens, require a heat too great for the hard to support; fixed alkaline salts, common salt, and nitre, require a red or almost white heat to melt them; and glass, a full white heat.

242. Among metallic substances, tin, bismuth, and lead, flow long before ignition: antimony likewise melts before it is visibly red-hot, but not before the vessel is considerably so: the regulus of antimony demands a much stronger fire. Zinc begins to melt in a red heat; gold and silver require a low white heat; copper, a bright white heat; and iron, an extreme white heat.

243. One body, rendered fluid by heat, becomes sometimes a menstruum for another not fusible of itself in the same degree of fire. Thus red-hot silver melts on being thrown into melted lead less hot than itself: and thus if steel, heated to whiteness, be taken out of the furnace, and applied to a roll of sulphur; the sulphur instantly liquefying, occasions the steel to melt with it; hence the *chalybs cum sulphure* of the shops. This concrete, nevertheless, remarkably impedes the fusion of some other metals, as lead, which, when united with a certain quantity of sulphur, is scarce to be perfectly melted by a very strong fire: hence the method, described in its place, of purifying zinc, a metal which sulphur has no effect upon, from the lead so frequently mixed with it.

244. Sulphur is the only unmetallic substance which mingles in fusion with metals. Earthy, saline, and other like matters, even the calces and glasses prepared from metals themselves, float distinct upon the surface, and form what is called *scoria* or dross. Where the quantity of this is large in proportion to the metal, it is most commodiously separated by pouring the whole into a conical mould: the pure metal or *regulus*, tho' small in quantity, occupies a considerable height in the lower narrow part of the cone, and when congealed may be easily freed from the scoria by a hammer. The mould should be previously greased, or rather smoked, to make the metal come freely out; and thoroughly dried and heated, to prevent the explosion which sometimes happens from the sudden contact of melted metals with moist bodies.

SECT. XIII. Calcination.

245. By calcination is understood the reduction of solid bodies by the means of fire, from a coherent to a powdery state, accompanied with a change of their quality; in which last respect this process differs from comminution.

246. To this head belong the burning of vegetable

table and animal matters, otherwise called *uſſion*, *incineration*, or *concremation*; and the change of metals into a powder, which in the fire either does not melt, or *vitriſies*, that is, runs into glaſs.

247. The metals which melt before ignition, are calcined by keeping them in fuſion for ſome time. The free admillion of air is eſſentially neceſſary to the ſucceſs of this operation; and hence, when the ſurface of the metal appears covered with calx, this muſt be taken off or raked to one ſide; otherwiſe, the remainder, excluded from the air, will not undergo the change intended. If any coal, or other inflammable matter that does not contain a mineral acid, be ſuffered to fall into the veſſel, the effect expected from this operation will not be produced, and part of what is already calcined will be *revived* or *reduced*; that is, it will return into its metallic form again.

248. Thoſe metals which require a ſtrong fire to melt in, calcine with a much leſs heat than is ſufficient to make them flow. Hence the burning or *ſcorification* of ſuch iron or copper veſſels as are long expoſed to a conſiderable fire without defence from the air. Gold and ſilver are not calcinable by any degree of fire.

249. In calcination, the metals viſibly emit fumes; nevertheleſs, the weight of the calx proves greater than that of the metal employed. The antimonical regulus gains about one-eleventh part of its weight; zinc, ſometimes one-tenth; tin, above one-fixth; and lead, in its converſion into minium, oftentimes one-fourth.

250. The calcination of metallic bodies (gold, ſilver, and mercury excepted) is greatly promoted by nitre. This ſalt, expoſed to the fire in conjunction with any inflammable ſubſtances, extricates their inflammable matter, and burſts with it into flame, accompanied with

a hiſſing noiſe: this proceſs is uſually termed *deſlagration* or *detonation*.

251. All the metallic calces and ſcoriæ are revived into their metallic ſtate, by fuſion with any vegetable or animal inflammable matter. They are all more difficult of fuſion than the reſpective metals themſelves; and ſcarcely any of them, thoſe of lead and biſmuth excepted, can be made to melt at all, without ſome addition, in the ſtrongeſt fire that can be produced in the common furnaces. The additions called *fluxes*, employed for promoting the fuſion, conſiſt chiefly of fixed alkaline ſalts: a mixture of alkaline ſalt with inflammable matter, as powdered charcoal, is called a *reducing flux*, as contributing at the ſame time to bring the calx into fuſion and to revive it into metal. Such a mixture is commonly prepared from one part of nitre and two parts of tartar; by grinding them well together, ſetting the powders on fire with a bit of coal or a red-hot iron, then covering the veſſel, and ſuffering them to deſlagrate or burn, till they are changed into a black alkaline coaly maſs. This is the common reducing flux of the chemiſts; and is called from its colour, the *black flux*. Metallic calces, or ſcoriæ, mingled with twice their weight of this compound, and expoſed to a proper fire, in a cloſe-covered crucible, melt, and reſume their metallic form: but tho' they received an increaſe of weight in the calcination, the revived metal is always found to weigh conſiderably leſs than the quantity which the calx was made from.

For a more particular account of all theſe proceſſes, and an explanation of the principles on which they depend, ſee *CHEMISTRY paſſim*, and the articles themſelves as they occur in the order of the alphabet.

PART II. PREPARATIONS AND COMPOSITIONS;

Containing thoſe of the LONDON and EDINBURGH PHARMACOPOEIAS, as directed in the LAST editions.

C H A P. I.

Pharmaceutical PREPARATIONS.

SECT. I. *The more Simple Preparations.*

The preparation of EARTHY and ſuch other pulverable bodies as will not diſſolve in water.

252. Theſe ſubſtances are firſt to be pulveriſed in a mortar, and then levigated with a little water, upon a hard and ſmooth marble, into an impalpable powder: this is to be dried upon a chalk-ſtone, and afterwards ſet by for a few days, in a warm, or at leaſt very dry place. *L.*

253. After this manner are to be prepared,

254. *Verdegriſ.* *L.*

255. *Antimony.* *L. E.*

256. *Crab's claws.* *L. E.*

257. *Coral.* *L. E.*

258. *Chalk.* *L. E.* This is firſt to be powdered, and then well waſhed with water, till the latter comes off without either colour or taſte. *E.*

259. *Bezoar ſtone*; which is to be moiſtened in the levigation with ſpirit of wine inſtead of water. *L.*

VOL. VIII.

260. *Calamine ſtone*, previously calcined, is to be had from thoſe who make braſs. *L. E.*

261. *Blood-ſtone.* *L. E.*

262. *Lapis lazuli.* *E.*

263. *Pearls.* *L. E.*

264. *Crab's eyes*, ſo called. *L. E.*

265. *Oyster-ſhells*, waſhed clean from dirt, (*L.*) The hollow ſhells are to be preferred to the plain, (*E.*) becauſe they contain more of the fine white earth in proportion to the rough outward coat; which laſt appears to be largely impregnated with marine ſalt.

266. *Egg-ſhells*, freed, by boiling, from the ſkin that adheres to them. *L.*

267. *Amber.* *L.*

268. *Tutty.* *L. E.*

269. In preparing antimony, calamine, and tutty, particular care ought to be taken to reduce them into the moſt ſubtle powder poſſible. *L.*

272. Some few ſubſtances are more advantageuſly levigated with ſpirit of wine than with water. Thus bezoar has the green colour, uſually expected in this coſtly preparation, conſiderably improved thereby. A little ſpirit may be added to the other animal-ſubſtances, if the weather is very hot, and large

Prepara-
tions.Prepara-
tions.

quantities of them are prepared at once, to prevent their running into putrefaction; an accident which, in those circumstances, sometimes happens when they are levigated with water only. Crab's eyes, which abound with animal gelatinous matter, are particularly liable to this inconvenience.

273. The caution given above for reducing antimony, calamine, and tutty, to the greatest subtilty possible, demands particular attention. The tenderness of the parts to which the two last are usually applied, requires them to be perfectly free from any admixture of gross irritating particles. The first, when not thoroughly comminuted, might not only, by its sharp needle-like spicula, wound the stomach, but likewise answers few valuable purposes as a medicine, proving either an useless load upon the viscera, or at best passing off without any other sensible effect than an increase of the grosser evacuations; whilst, if reduced to a great degree of fineness, it turns out to be a medicine of considerable efficacy.

274. The most successful method of obtaining these powders of the requisite tenuity, is to wash off the finer parts by means of water, and continue levigating the remainder till the whole becomes fine enough to remain for some time suspended in the fluid. The process is thus directed in the Edin. Pharm.

A quantity of water is to be poured upon the levigated powder, in a large vessel, and the vessel repeatedly shaken, that the finer parts of the powder may be diffused through the water: the liquor is then to be poured off, and set by till the powder settles. The gross part, which the water would not take up, is to be further levigated, and treated in the same manner.

After this method are prepared antimony, calamine, tutty, bloodstone, chalk, and lapis lazuli.

275. By this method, which is that commonly practised in the preparation of colours for the painter, powders may be obtained of any required degree of tenuity; and without the least mixture of the gross parts, which are always found to remain in them after long continued levigation: all the coarser matter settles at first, and the finer powder continues suspended in the water, longer and longer, in proportion to the degree of its fineness. The same process may likewise be advantageously applied to other hard pulverable bodies of the mineral kingdom, or artificial preparations of them; provided they are not soluble in, or specifically lighter than, water. The animal and absorbent powders, crab's-claws, crab's-eyes, oyster-shells, egg-shells, chalk, pearl, coral, and bezoar, are not well adapted to this treatment; nor indeed do they require it. These substances are readily soluble in acid juices without much comminution: if no acid is contained in the first passages, they are apt to concret, with the mucous matter usually lodged there, into hard indissoluble masses; the greater degree of fineness they are reduced to, the more are they disposed to form such concretions, and enabled to obstruct the orifices of the small vessels.

276. *The purification or trying of hog's lard and mut-ton suet.* L.

Chop them into small pieces, and melt them by a gentle heat, with the addition of a little water; then strain them from the membranes.

The use of the water is to prevent the fat from burning and turning black; which it does very effectually, though it somewhat prolongs the process, and is likewise apt to be in part imbibed by the fat.

277. *The purification of viper's fat.* L.

Let the fat, separated from the intestines, be melted by a gentle fire, and then pressed thro' a thin linen cloth.

The quantity of this fat usually purified at a time is so small, that the heat may be easily regulated so as to prevent burning, without the addition of any water.

278. *The depuration or clarifying of honey.* L. E.

Let the honey be liquefied in a water-bath, (that is, by setting the vessel containing the honey in a vessel of hot water), and the scum which arises taken off.

The intention of this process is to purify the honey from wax or other droffy matters that have been united with it by the violence of the press in its separation from the comb, and from meal and such like substances which are sometimes fraudulently mingled with it. When the honey is rendered liquid and thin by the heat, these lighter matters rise freely to the surface.

279. *The drying of squills.*

Let the squill, cleared from its outer skin, be cut transversely into thin slices, and dried with a very gentle heat. L. The operation is known to have been successfully performed when the squill becomes brittle without losing its acrimony and bitterness. E.

By this method the squill dries much sooner than when only its several coats are separated, as has been usually directed; the internal part being here laid bare, which, in each of the entire coats, is covered with a thin skin, which impedes the exhalation of the moisture. The root loses, in this process, four fifths of its original weight; the parts which exhale appear to be merely watery: hence six grains of the dry root are equivalent to half a dram of it when fresh; a circumstance to be particularly regarded in the exhibition of this medicine.

280. *The burning of sponge.*

Burn the sponge in a close earthen vessel, until it becomes black and easily friable, then powder it in a glass or marble mortar. L. The sponge is to be cut in small pieces, and well freed from earthy matters previous to the operation, and is to be frequently stirred during the time of burning. E.

This medicine, only lately received in the dispensatory, has been in use for a considerable time, and employed against feropulous disorders and cutaneous foulnesses, in doses of a scruple and upwards. Its virtues seem to depend upon a volatile salt, just formed and combined with its own oil; if the sponge be distilled with a stronger heat, it yields a large proportion of that salt in its proper form. The salt is in this preparation so far extricated, that if the burnt sponge be ground in a brass mortar, it corrodes the metal, so as to contract a disagreeable taint, and sometimes an emetic quality.

A good deal of address is requisite for managing this

this process in perfection. The sponge should be cut small, and beaten for some time in a mortar, that all the stony matters may be got out, which, compared with the weight of the sponge when prepared, will sometimes amount to a considerable quantity. The burning should be discontinued as soon as ever the matter is become thoroughly black. If the quantity put into the vessel at once is large, the outside will be sufficiently burnt before the inside is affected; and the volatile salt of the former will in part escape before that in the latter is begun to be formed. The best method of avoiding this inconvenience seems to be, to keep the sponge continually stirring, in such a machine as is used for the roasting of coffee.

281. *The calcination of hartshorn. L.*

Burn pieces of hartshorn in a potter's furnace, till they become perfectly white; then powder and levigate them after the same manner as the other earthy bodies.

The intention here is, totally to burn out and expel the oil, salt, and other volatile parts, so as to leave only a white insipid animal earth. For this purpose, a strong fire and the free admission of air are necessary. The potter's furnace is directed merely for the sake of convenience; where this is not to be had, any common furnace or stove may be made to serve: on the bottom of the grate spread some lighted charcoal, and above this lay the horns. The whole will burn vehemently; the vegetable matter is reduced to ashes; and the horns are burnt to whiteness, still retaining their original form, by which they are easily distinguished from the other: they ought to be separated as soon as grown cold, to prevent their imbibing any fixed salt from the vegetable ashes moistened by the air. The horns left after the distillation of the volatile salt and oil of hartshorn are as proper for this use as any other; that process only collecting such parts as are here dissipated in the air.

Calcined hartshorn is the purest of the animal absorbent powders; as being perfectly free from any glutinous or oily matter, which most of the others abound with. It appears nevertheless to be one of the weakest in absorbent power, or the most difficult of solution in acids.

282. *The extraction of pulps. L.*

Ureipe pulpy fruits, and ripe ones if they are dry, are to be boiled in a small quantity of water until they become soft; then press out the pulp thro' a strong hair-sieve, and afterwards boil it down to a due consistence, in an earthen vessel, over a gentle fire; taking care to keep the matter continually stirring, to prevent its burning.

283. The pulp of *casha fistularis* is in like manner to be boiled out from the bruised pod, and reduced afterwards to a proper consistence, by evaporating the water.

284. The pulps of fruits that are both ripe and fresh, are to be pressed out thro' the sieve, without any previous boiling.

285. *The straining of storax. L.*

Soften storax calamita in hot water; then press it out betwixt warm iron plates; and separate the storax,

now purified, from the water.

The storax commonly met with, stands greatly in need of purification. It contains a large quantity of woody matter, which this process effectually frees it from, though in other respects liable to some inconveniences. The woody substance in some measure defends the storax from the action of the press, and retains part of it behind; at the same time that the storax is apt to suffer a considerable dissipation of its volatile parts, in which its fragrance and principal virtue consist. To prevent as much as possible this last inconvenience, the operator ought carefully to avoid using a greater heat than is absolutely necessary; and as soon as the storax is sufficiently softened, to be expeditious in the straining of it.

Storax may be excellently purified by means of spirit of wine, which this resin totally dissolves in, so as to pass thro' a filtre, the impurities alone being left. If the storax is afterwards wanted in a solid form, it may be recovered from this solution by gently distilling off the spirit, which will elevate very little of its flavour, or by pouring to it a quantity of water. See Sect. vi. § 3.

286. *Strained opium, or the Thebaic extract. L.*

Take of opium, cut into slices, one pound; dissolve it into the consistence of a pulp, in a pint of boiling water, with care to prevent its burning; and whilst it remains quite hot, strongly press it from the feces, thro' a linen-cloth; the strained opium is then to be reduced, by a water-bath or other gentle heat, to its original consistence.

Opium, thus softened by a small quantity of water, passes the strainer entire, the feces only being left behind. If it was dissolved in a large quantity of water, its resinous and gummy parts would be separated from one another.

Where large quantities of opium are purified at once, the inspissation is most commodiously performed in a water-bath; but small quantities may be very safely inspissated, by placing the vessel immediately over a gentle fire, the matter being kept stirring, and the vessel occasionally removed from the fire whenever there is any suspicion of its becoming too hot. The grosser impurities of the opium are by this process effectually separated; but some of its heterogeneous admixtures, consisting chiefly of dust and farinaceous matters, are so fine, as partly to pass along with it through the pores of the strainer when diluted by the press: this manifestly appears upon boiling the strained opium in water, and afterwards in spirit; when a considerable quantity of earthy matter will be left, which is not soluble in either of those menstrua.

287. The other gums, as ammoniacum, galbanum, asafoetida, and the like, are purified after the same manner; only here a larger quantity of water may be made use of without injury. If the resinous part happens to subside, take it out, and reserve it to be added again towards the end of the inspissation, that it may unite with the rest into one uniform mass.

Any gum that melts easily, as galbanum, may likewise be purified by including it in a bladder, and keeping it in boiling water, until the gum becomes soft enough to be pressed from its impurities through a canvas strainer. L.

288. *Preparation of millepedes, &c.*

The millepedes are to be inclosed in a thin canvas-cloth, and suspended over hot spirit of wine, in a close vessel, till they are killed by the steam, and rendered friable. *L. E.*

Purification of iron filings.—Let the filings be laid upon a sieve, and a magnet applied below, so that they may be gradually attracted through it. *E.*

Preparation of iron filings.—Let purified filings of iron be laid in a moist place till they fall down in rust, which is to be rubbed into an exceeding fine powder. *E.*

SECT. II. *Substances extracted from Vegetables by Expression.*

§. I. JUICES.

289. JUICES are obtained from the succulent parts of plants, by including them, after being properly cut, bruised, &c. in a hair-bag, and pressing them, between wooden checks, in the common screw-press, as long as any liquor drops from them.

290. The harder fruits require to be previously well beaten or ground; but herbs are to be only moderately bruised; for if these are over bruised, a large quantity of the herbaceous matter will be forced out along with the juice. Hempen or woollen bags are apt to communicate a disagreeable flavour; the threads of these likewise swell in proportion as they imbibe moisture, so as in great measure to prevent the free percolation of the juice.

291. The fluids thus extracted from succulent fruits, both of the acid and sweet kind; from most of the acid herbs, as scurvy-grafs and water-cresses; from the acid herbs, as sorrel and wood-sorrel; from the aperient lactescent plants, as dandelion and hawkweed; and from sundry other vegetables, contain great part of the peculiar taste and virtues of the respective subjects. The juices, on the other hand, extracted from most of the aromatic herbs, as those of mint and the fragrant Turkey balm, commonly called *balm of gilead*, have scarce any thing of the flavour of the plants, and seem to differ little from decoctions of them, made in water, boiled till the volatile odoriferous parts have been dissipated. Many of the odoriferous flowers, as the lily, violet, hyacinth, not only impart nothing of their fragrance to their juice, but have it totally destroyed by the previous bruising. From want of sufficient attention to these particulars, practitioners have been frequently deceived in the effects of preparations of this class: juice of mint has been often prescribed as a stomachic, though it wants those qualities by which mint itself, and its other preparations, operate in that intention.

292. The juices thus forcibly pressed out from plants, differ from those which flow spontaneously or from incisions; these last consisting chiefly of such fluids as are not diffused through the whole substance of the vegetable subjects, but elaborated in distinct vessels, or secreted into particular receptacles. From poppy-heads, slightly wounded, there issues a thick milky liquor, which dries, by a moderate warmth, into opium; whilst the juice obtained from them by pressure is of a dark green colour, and far weaker virtue.

293. Juices newly expressed are generally thick,

viscid, and very impure: by colature, a quantity of gross matter is separated, the juice becomes thinner, limpid, and better fitted for medicinal purposes, though as yet not entirely pure: on standing, it becomes again turbid, and apt to run into a fermentative or putrefactive state. Clarification with whites of eggs renders the juices more perfectly fine; but there are few that will bear this treatment without a manifest injury to their flavour, taste, and virtue.

294. The most effectual method of purifying and preserving these liquors is, to let the strained liquors stand in a cool place till they have deposited their grosser feces, and then gently pass them several times thro' a fine strainer till perfectly clear; when about $\frac{1}{20}$ th part their weight of good spirit of wine may be added, and the whole suffered to stand as before: a fresh sediment will now be deposited, from which the liquor is to be poured off, strained again, and put into small bottles that have been washed with spirits and dried. A little oil is to be poured on the surface, so as very nearly to fill the bottles, and the mouths closed with leather, paper, or stopped with straw, as the flasks in which Florence wine is brought to us: this serves to keep out dust, and suffers the air, which in process of time arises from all vegetable liquors, to escape; which air would otherwise endanger the bursting of the glasses, or, being imbibed afresh, render their contents rapid and foul. The bottles are to be kept on the bottom of a good cellar or vault, placed up to the necks in sand. By this method, juices may be preserved a year or two; and some for much longer time.

295. *The scorbutic juices, &c.*

Take of the juice of garden scurvy-grafs, two pints; brooklime, water-cresses, each one pint; Seville oranges, a pint and quarter. Mix them together, let them stand till the feces have subsided, and then either pour the liquor off clear, or pass it through a strainer. *L.*

Take of juice of garden scurvy-grafs, oranges, water-cresses, each two pints; spirituous nutmeg-water, half a pint. Mix all together, and set by the liquor till the feces have subsided; then pour off the clear. *E.*

These juices are of considerable use for the purposes expressed in the title; and may be taken, from an ounce or two to a quarter of a pint, two or three times a day. They generally increase the urinary secretion, and sometimes introduce a laxative habit.

296. *Infusified juice, commonly called extract, of woffbane.*

Let the fresh leaves of woffbane be included in a canvas bag, and strongly squeezed in a press, in order to give out their juice, which is to be infusified to the consistence of thick honey, in vessels exposed to the steam of boiling water, keeping it carefully stirring towards the end.

After the same manner are prepared the infusified juices or extracts of belladonna, flammula jovis, hyosciamus, and stramonium. *E.*

297. *Infusified juice, or extract, of hemlock.*

Having expressed the juice of the fresh leaves and stalks of hemlock while in flower, as directed for woffbane,

bane, and inspissated it to the confidence of honey; let the whole cool, and then add as much of the powder of dried hemlock-leaves as is sufficient to make the mass of a due consistency for pills. Care, however, must be taken, that the evaporation proceed only as far as to admit about a fifth part of the powder.

§ 2. EXPRESSED OILS.

298. EXPRESSED oils are obtained chiefly from certain seeds and kernels of fruits, by thoroughly pounding them in a stone-mortar, or, where the quantities are large, grinding them in mills, and then including them in a canvas bag, which is wrapped in a hair-cloth, and strongly pressed betwixt iron plates. The canvas, if employed alone, would be squeezed to close to the plates of the press as to prevent the oil from running down: by the interposition of the hair-cloth, a free passage is allowed it.

299. Sundry machines have been contrived both for grinding the subject and pressing out the oil, in the way of business. To facilitate the expression, it is customary to warm either the plates of the press, or the subject itself after the grinding, by keeping it stirring in a proper vessel over the fire: the oil, liquefied by the heat, separates more freely and more plentifully. When the oil is designed for medicinal purposes, this practice is not to be allowed: for heat, especially if its degree is sufficient to be of any considerable advantage for promoting the separation, renders the oil less soft and palatable, impresses a disagreeable flavour, and increases its disposition to grow rancid: hence the colleges both of London and Edinburgh expressly require the operation to be performed without heat.

Nor are the oils to be kept in a warm place after their expression. Exposed but for a few days to a heat no greater than that of the human body, they lose their emollient quality, and become highly rancid and acrimonious. Too much care cannot be taken for preventing any tendency to this acid irritating state, in medicines so often used for abating immoderate irritation.

So much are these oils disposed to this injurious alteration, that they frequently contract an acrimony and rancidity while contained in the original subjects. Hence great care is requisite in the choice of the unctuous seeds and kernels, which are often met with very rancid: almonds are particularly liable to inconveniences of this kind.

300. Expresed oils are prepared for mechanic uses from sundry different subjects, as nuts, poppy-seed, hemp-seed, rape-seed, and others. Those directed for medicinal purposes in the London and Edinburgh Pharmacopœias, are,

301. *Oil of almonds.* L. E.

302. *Oil of linseed.* L. E.

303. *Oil of mustard seed.* L.

304. *Oil of ricinus.* E.

305. The oil of almonds is prepared from the sweet and bitter almonds indifferently; the oils obtained from both sorts being altogether the same. Nor are the differences of the other oils very considerable, the discriminating qualities of the subjects not residing in the oils that are thus obtained by expression: the oil of mustard-seed is as soft, insipid, and void of pungency,

as that of sweet almonds, the pungency of the mustard remaining entire in the cake left after the expression. The several oils differ in some of their properties from one another; but in medicinal qualities they appear to be all nearly alike, and agree in one common emollient virtue. They soften and relax the solids, and obtund acrimonious humours: and thus become serviceable, internally, in pains, inflammations, heat of urine, hoarseness, tickling coughs, &c.; in glysters, for lubricating the intestines, and promoting the ejection of indurated feces; and in external applications for tension and rigidity of particular parts. Their common dose is half an ounce: in some cases, they are given to the quantity of three or four ounces. The most commodious forms of their exhibition we shall see hereafter, in the section of *Emulsions*.

306. The oils expressed from aromatic substances differ from the foregoing, in retaining for the most part an admixture of the aromatic matter of the subject. Thus nutmegs and mace yield, upon expression, an oil impregnated with the flavour of the spices; and an oil expressed from aniseeds, has a great share of the peculiar smell of the seeds. A purgative oil also is extracted in America from the purgative seeds of the ricinus. It does not appear that other qualities of vegetables are communicated to their expressed oils.

307. The rinds of the several varieties of oranges, lemons, and citrons, yield by a kind of expression their essential oils almost pure, and nearly similar to those which are obtained from them by distillation. The essential oils, in which the fragrance and aromatic warmth of these fruits reside, are contained in numerous little vesicles, which may be distinguished by the naked eye, spread all over the surface of the peel. If the rind is cut in slices, and the slices separately doubled or bent in different parts, and squeezed between the fingers, the vesicles burst at the bending, and discharge the oil in a number of fine slender jets. A glass-plate being set upright in a glass or porcelain vessel, and the slices squeezed against the plate, the little jets unite into drops upon the plate, and trickle down into the vessel beneath. But though this process affords the true native oil, in the same state wherein it existed in the subject, unaltered by fire or other agents, it is not practicable to advantage, unless where the fruit is very plentiful, as only a small part of the oil it contains can thus be extracted or collected.

The oil is more perfectly separated by rubbing the rind upon a lump of sugar. The sugar, by the inequality of its surface, produces the effect of a rasp in tearing open the oily vesicles; and in proportion as the vesicles are opened, the sugar imbibes the oil. When the outward part of the lump is sufficiently moistened, it is scraped off, and the operation continued on the fresh surface. The oil thus combined with the sugar, is fit for most of the uses to which it is applied in a fluid state. Indeed, the pure essential oils obtained by distillation are often purposely mixed with sugar, to render their use the more commodious.

SECT. III. *Infusions in different Menstrua.*

§ 1. INFUSIONS and DECOCTIONS in WATER.

WATER, the direct menstruum of gums and salts, extracts readily the gummy and saline parts of vegetables. Its action, however, is not limited to these; the

the refinous and oily principles being, in most vegetables, so intimately blended with the gummy and saline, as to be in great part taken up along with them: some of the refinous cathartics, and most of the aromatic herbs, as well as bitters and astringents, yield to water the greatest part of their smell, taste, and medicinal virtue. Even of the pure essential oils and odorous refinings of vegetables, separated from the other principles, water imbibes a part of the flavour; and by the artificial admixture of gummy or saline matter, the whole substance of the oil or refin is made dissoluble in water.

308. Of pure salts, water dissolves only certain determinate quantities, (see n° 162): by applying heat, it is generally enabled to take up more than it can do in the cold, and this in proportion to the degree of heat; but as the liquor cools, this additional quantity separates, and the water retains no more than it would have dissolved without heat. With gummy substances, on the other hand, it unites unlimitedly, dissolving more and more of them till it loses its fluidity: heat expedites the action of the water, but cannot enable it to take up more than it would do, by allowing it longer time in the cold. The active parts extracted from most vegetables by water, and oils and refinings made soluble in water by the artificial admixture of gum, partake of this property of pure gums, being dissoluble without saturation.

309. It has been imagined that vegetables in a fresh state, while their oily, refinous, and other active parts, are already blended with a watery fluid, would yield their virtues to water more freely and more plentifully than when their native moisture has been dissipated by drying. Experience however shews, that dry vegetables in general give out more than fresh ones, water seeming to have little action upon them in their recent state. If, of two equal quantities of mint, one be infused fresh in water, and the other dried and then infused in the like quantity of water for the same length of time, the infusion of the dry herb will be remarkably the strongest: and the case appears to be the same in all the vegetables that have been tried.

310. In all the preparations described in this section, it is to be understood that the subjects must be moderately and newly dried; unless when they are expressly ordered to be taken fresh; in which case it is to be judged that their virtues are destroyed or impaired by drying.

311. The native colours of many vegetables are communicated to water along with their medicinal matter: many impart a colour different from their own; and others, tho' of a beautiful and deep colour themselves, give scarcely any to the menstruum. Of the first kind are the yellow and red flowers; of the second, the leaves of most plants; of the third, some of the blue flowers, as those of cyanus and larkspur. Acid liquors change the infusions of most flowers, the yellow ones excepted, to a red; and alkalies, both fixed and volatile, to a green.

312. From animal-substances, water extracts the gelatinous and nutritious parts, whence glues, gellies, broths, &c.; and along with these, it takes up principles of more activity, as the acrid matter of cantharides. It dissolves also some portion of calcined calcareous earths, both of the animal and of the mineral

kingdom, but has no action on any other kind of earthy matter.

Preparations.

Art. i. *Infusions in cold Water.*

313. *Infusion of carduus.*

Take an ounce of the dried leaves of carduus benedictus, and a pint of common water; let them steep for six hours without heat, and then filter the liquor through paper.

By this management, only the finer parts of the carduus are extracted, and the infusion proves an agreeable light bitter: it sits easier on the stomach than any other medicine of the bitter kind; whereas, by long continued maceration, or by the application of heat, the grosser and more ungrateful parts are taken up, and the liquor becomes nauseous, so as to provoke vomiting. The light infusion is often given with great benefit in weaknesses of the stomach, where the common bitters do not agree. It may be flavoured at pleasure with aromatic materials; instead of pure water, a mixture thereof with some grateful distilled spirituous water, as 12 ounces of common water, and four of the spirituous water of orange-peel, may be used for the menstruum. The little quantity of spirit contained in this compound will not considerably vary the dissolving power of the water.

314. Many other vegetables may be advantageously treated in the same manner. From those which are weak in virtue, rich infusions may be obtained, by returning the liquor upon fresh quantities of the subject, the water loading itself more and more with the active parts. These loaded infusions are doubtless applicable to valuable purposes in medicine, as they contain, in a small compass, the finer, more subtle, and active principles of vegetables, in a form readily miscible with the fluids of the human body.

315. *Tincture of mint. E.*

Take half an ounce of the dry leaves of spearmint, and a pint of simple mint-water. Steep them in a close vessel, in a warm place, for four hours, and then strain out the tincture.

The distilled water of mint is impregnated with as much of the volatile parts of the herb, as water can be made to retain by distillation. By infusion, however, it still takes up more, being equally effectual, as a menstruum, with fresh water; hence the tincture proves very rich in the virtue of the mint. This is another useful method of obtaining strong infusions from vegetables, and it may be varied at discretion; the distilled water of one plant may be employed as a menstruum for another.

316. *Infusion of Peruvian bark.*

Take an ounce of Peruvian bark reduced into fine powder, and twelve ounces of water. Macerate without heat for twenty-four hours, occasionally shaking the vessel; then pour off the clear liquor, and pass it through a fine strainer.

The infusion appears to be one of the best preparations of the bark for weak stomachs, and may be given in doses of two or three ounces, in intermitting fevers, and in other disorders where the corroborating virtues of bark are required.

317. *Tar-water.*

Take of tar, two pounds; water, one gallon. Stir them strongly together with a wooden rod; and after standing to fettle for two days, pour off the water for use.

Tar-water was some time ago recommended to the world as a certain and safe medicine in almost all diseases; a flow yet effectual alternative in cachexies, scurvy, chlorotic, hysterical, hypochondriacal, and other chronic complaints; and a sudden remedy in acute distempers which demand immediate relief, as pleurisy, peripneumonies, the small-pox, and all kinds of fevers in general. The medicine, though certainly far inferior to the character that has been given of it, is doubtless, in many cases, of considerable utility: it sensibly raises the pulse, and occasions some considerable evacuation, generally by perspiration or urine, though sometimes by stool or vomit: hence it is supposed to act by increasing the vis vitæ, and enabling nature to expel the morbid humors.

318. *Lime-water.*

Take a pound of quicklime, and a gallon and a half of water. Pour the water gradually upon the lime; and when the ebullition is over, let the whole stand to fettle; then filter the liquor through paper. *L.*

Take a pound of fresh burnt quicklime, and two gallons of water. Pour the water by little and little upon the lime; and when the ebullition is over, strongly shake the vessel; then let the whole stand at rest, that the lime may fettle; and after two days filter the liquor, which is to be kept in vessels closely stoppered. *E.*

A lime-water may be prepared in the same manner from calcined oyster-shells.

321. Lime-water has been found of great service in scrophulous and scorbutic complaints; in some kinds of alvine fluxes, female weaknesses, and other disorders proceeding from a laxity and debility of the solids; particularly in corpulent and phlegmatic habits. It appears likewise to be possessed of a lithontriptic power, and in sundry calculous cases has procured considerable relief: the lime-water prepared from calcined oyster-shells is found to be, in this intention, more efficacious than that of the common bone or chalk lime. It is given internally, in the dose of a quarter of a pint, three or four times a-day; and likewise used externally for washing foul ulcers.

Compound lime-water. E.

Take of saffras, root and bark, shaved, two ounces; nutmegs, well bruised, three drams; liquorice, sliced, one ounce; lime-water, fresh prepared, four pints. Digest them together for two days, in a very close vessel; and then strain the liquor.

Lime-water left compounded. L.

Take of liquorice, one ounce; saffras-bark, half an ounce; simple lime-water, six pints. Macerate without heat for two days; and then strain the liquor.

Lime-water more compounded. L.

Take of guaiacum wood, shaved, half a pound; li-

quorice, one ounce; saffras-bark, half an ounce; coriander-seeds, three drams; simple lime-water, six pints. Macerate without heat for two days; and then strain off the liquor.

In all these compositions, the additional articles take off the ill flavour of the lime-water, render it more grateful both to the palate and stomach, and at the same time considerably promote its medicinal efficacy, especially when intended against cutaneous disorders, and foulness of the blood and juices. They may be taken in the same quantities as the simple lime-water, and continued for some time; the patient keeping moderately warm during their use.

319. *The Gretaceous potion.*

Take of prepared chalk, gum arabic, of each one ounce; fine sugar, half an ounce; common water, two pints; spirituous nutmeg-water, two ounces. Mix them together. *E.*

Art. ii. *Infusions in BOILING Water.*320. *Simple bitter infusion. L.*

Take of gentian root, fresh yellow rind of lemon-peel, carefully freed from the inner white part, each half an ounce; dry yellow rind of Seville orange-peel, freed in like manner from the white, one dram and a half; boiling water, three quarters of a pint. Macerate for an hour or two; then filter the liquor through paper, or pass it through a strainer, without pressure.

This is a very elegant and useful bitter; as agreeable to the taste as can well be contrived, the pills communicating a fine flavour; which is the only addition that the gentian stands in need of.

321. *Purging bitter infusion. L.*

Take of senna, yellow rind of lemon-peel, fresh, each three drams; gentian root, yellow rind of Seville orange-peel, dry; lesser cardamom-seeds, freed from the husks, each half a dram; boiling water, five ounces by measure. Macerate them together; and when cold, strain off the liquor.

322. *Bitter infusion with senna. E.*

Take of senna, one dram; gentian root, sweet fennel-seeds, each half a dram; boiling water, a quarter of a pint. Infuse them for four hours, and then strain the liquor.

This infusion may likewise be prepared with two, three, or more times the quantity of senna.

Both these are useful purging bitters. The quantities here prescribed are intended for one dose; the first is the largest, and the other the smallest dose in which senna is usually given.

323. *Common infusion of senna. L.*

Take of senna, an ounce and a half; crystals of tartar, three drams; lesser cardamom-seeds, freed from the husks, two drams; water, one pint. Boil the crystals of tartar in the water until they are dissolved; then pour the water, whilst it continues boiling, upon the other ingredients; and when cold, strain off the liquor for use.

In the former *L. Pharmacopœia*, an alkaline salt was used

used in the infusion of senna, instead of the acid one here directed. The first was supposed to promote the operation of the medicine, by superadding a degree of purgative virtue of its own, and by enabling the water to extract somewhat more from the capital ingredient than it would be capable of doing by itself; whilst acids have rather a contrary effect. Experience, however, has sufficiently shown, that this infusion, and the following one with lemon-juice, do not fail in their intention; and, in a medicine very nauseous to many, it is of principal consequence to prepare it so, that the lightest and least disgusting parts may be extracted. Alkaline salts increase the offensiveness of the senna; whilst crystals of tartar considerably improve the colour of the infusion, and likewise render the taste to some persons less disagreeable. Soluble tartar should seem a good ingredient in these kinds of compositions, as it not only improves the taste, but promotes the purgative virtue of the medicine: this addition also renders the infusion less apt to gripe or occasion flatulencies.

324. *Infusion of senna with lemon.* L.

Take of senna, an ounce and a half; yellow rind of lemon-peel, fresh, one ounce; lemon-juice, one ounce by measure; boiling water, one pint. Macerate them together; and when cold, strain off the infusion.

This is a very pleasant and sufficiently efficacious purge: the Committee observe, that it is the most agreeable form they have been able to contrive for the exhibition of senna to such as are more than ordinarily offended with its flavour. The dose is from two ounces to four.

325. *Infusion of tamarinds with senna.* L.

Take of tamarinds, six drams; crystals of tartar, senna-leaves, of each one dram; coriander-seeds, half a dram; brown sugar, half an ounce; boiling water, eight ounces. Macerate the ingredients in a close earthen vessel unglazed, shaking it now and then. After four hours strain off the liquor. This infusion may be made with a double or triple quantity of senna.

326. *Infusion of rhubarb.* E.

Take of rhubarb, half an ounce; boiling water, half a pint. Infuse them for a night, and to the strained liquor add one ounce of spirituous cinnamon-water.

This appears to be one of the best preparations of rhubarb when designed as a purgative; water extracting its virtue more effectually than either vinous or spirituous menstrua: in this respect rhubarb differs from most of the other vegetable cathartics.

327. *Infusion of flammula jovis.* E.

Take of the dried leaves of the flammula jovis, two drams; boiling water, one pint. Macerate for a quarter of an hour; then let the liquor boil a little, and strain it. This may be made also with three or four drams of flammula jovis.

328. *Tincture of roses.*

Take of red rose-buds, freed from the white heels,

half an ounce; strong spirit (called *oil*) of vitriol, one scruple; boiling water, two pints and a half; double-refined sugar, one ounce and a half. First mingle the spirit of vitriol with the water in a glass or glazed earthen vessel, and in this mixture macerate the roses; when the liquor is grown cold, strain it, and add the sugar. L.

Take of red roses, cleared from the heels and dried, one ounce; spirit of vitriol, one dram; boiling water, four pints; white sugar, two-ounces. Macerate the roses with the boiling water for four hours in an unglazed earthen vessel; then add the acid, and, after the liquor is strained, the sugar. E.

This tincture is of an elegant red colour, and makes a very grateful addition to juleps in hæmorrhages, and all cases that require mild coolers and subastringents: it is sometimes taken with boluses or electuaries of the bark; and likewise makes a good gargle.

329. *Mucilage of gum-arabic.* E.

Take of gum-arabic in powder, four ounces; hot water, six ounces; mix them, diligently rubbing them together all the time, and strain through a linen cloth.

330. *Mucilage of gum tragacanth.* E.

Take of gum tragacanth in powder, one ounce; hot water, half a pint. Macerate for 24 hours; then rub the ingredients well together, and squeeze the mucilage through a linen-cloth.

Art. iii. DECOCTIONS.

331. THE effect of boiling differs from that of infusion in some material particulars. One of the most obvious differences is, that as the essential oils of vegetables, in which their specific odours reside, are volatile in the heat of boiling water, they exhale in the boiling along with the watery stream, and thus are lost to the remaining decoction; whereas both in cold and hot infusions they are preserved. Odorous substances, and those in general whose virtues depend on their volatile parts, are therefore unfit for this treatment. The soluble parts of these may, nevertheless, be united in this form with those of bodies of a more fixed nature, by boiling the latter till their virtues are sufficiently extracted, and then infusing the former in this decoction.

332. The extraction of the virtue of the subject is usually promoted or accelerated by a boiling heat; but this rule is less general than it is commonly supposed to be. We have already observed, that Peruvian bark gives out its virtue more perfectly by cold infusion than by coction. In some cases, boiling occasions a manifest disunion of the principles of the subject: thus, when almonds are triturated with cold water, their oil, blended with the mucilaginous or other soluble matter of the almond, unites with the water into a milky liquor called an *emulsion*; but on boiling them in water, the oil separates and rises to the surface; and if the most perfect emulsion be made to boil, a like separation happens.

333. *The white decoction.* L.

Take of calcined hartshorn, prepared, two ounces; gum-arabic, two drams; water, three pints. Boil them till only two pints remain; and then strain off the liquor.

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This decoction is used as common drink in acute diseases attended with a looseness, and where acrimonious humours abound in the *primæ viæ*. The gum is added in order to render the liquor lightly glutinous, and thus enable it to sustain more of the calx; which is the ingredient that the colour, but probably not the virtue, of the medicine depends upon. Calcined hartshorn has no quality from which it seems capable either of constringing and strengthening the vessels, giving a greater degree of consistency to this fluid, or obtunding acrimonious humours. It blunts and absorbs acid juices; but acrimony and acidity are very different; there are few (perhaps none of the acute) disorders of adults attended with the latter; and few of infants are unaccompanied therewith. Some have proposed starch as an ingredient in these kinds of decoctions; a small quantity of this soft gelatinous, farinaceous substance should seem to be greatly preferable to the earthy calx. It may be observed, that the water is not enabled by the boiling to dissolve any part of the calx; and that in the decoction the earth is only diffused in substance thro' the water, as it would be by agitation.

334. Decoction of the woods. E.

Take of guaiacum shavings, three ounces; raisins of the sun, stoned, two ounces; saffras wood shaved, liquorice sliced, of each one ounce; water, one gallon. Boil the guaiacum and raisins with the water, over a gentle fire, to the consumption of one half; adding towards the end, the saffras and liquorice. Strain out the liquor without pressure.

This decoction is very well contrived; and if its use is duly continued, will do great service in some cutaneous diseases, foulness of the blood and juices, and some disorders of the breast; particularly in cold phlegmatic habits. It may be taken by itself in the quantity of a quarter of a pint, two or three times a-day, or used as an assistant in a course of mercurial or antimonial alteratives; the patient in either case keeping warm, in order to promote the operation of the medicine.

335. Decoction of marshmallows root. E.

Take of marshmallow root, moderately dried, six ounces; large raisins, stoned, two ounces; common water, six pints. Boil to four pints, adding the other ingredients towards the end. Strain out the liquor, and let it settle till fine.

This decoction is intended chiefly as an emollient, to be liberally drank of in nephritic paroxysms; in which cases, by softening and relaxing the parts, it frequently relieves the pain, and procures an easy passage for the fabulous matter. Two or three ounces of this decoction may be taken for a dose.

336. Pectoral decoction. L.

Take common barley, stoned raisins, figs, each two ounces; liquorice, half an ounce; water, four pints. First boil the water with the barley, then add the raisins, and lastly (just before the end of the process) the figs and liquorice; the boiling is to be continued so long, that the liquor, when strained, may be no more than two pints. L.

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This decoction is an useful soft pectoral; and very agreeable to the palate. It is a good auxiliary in sharp defluxions on the breast and lungs, and has sometimes done service by itself. It may be drank at pleasure.

337. Barley-water. L. E.

Take of pearl-barley, two ounces; water, four pints. First wash the barley from the mealy matter that adheres to it, with some cold water; then boil it a little with about half a pint of fresh water, which will acquire a considerable tinge from it. Throw away this tinged water; put the barley into the water prescribed, made first to boil; and continue the boiling till half the water is wasted; then strain.

This liquor is to be drank freely, as a diluter, in fevers and other disorders. However trivial medicines of this class may appear to be, they are of greater importance in the cure of acute diseases, than many more laborious preparations.

338. Mucilage of quince-seeds. L.

Take of quince-seeds, one dram; water, six ounces by measure. Boil them over a soft fire, till the water grows slimy almost like the white of an egg; then pass it through a linen cloth.

This is a pleasant soft mucilage, of a somewhat sweetish taste, and a light agreeable smell: in these respects, and in its easy solubility in water, it differs from the mucilage of gum-tragacanth, to which some have supposed it similar: it has another difference, to its disadvantage, being apt to grow mouldy in keeping.

[339]—349. Viper-broth. L.

Take a middle-sized viper, freed from the head, skin, and intestines, and two pints of water. Boil them to a pint and a half; then remove the vessel from the fire; and when the liquor is grown cold, let the fat, which congeals upon the surface if the viper was fresh, be taken off. Into this broth, whilst warm, put a pullet of a moderate size, drawn and freed from the skin, and all the fat, but with the flesh entire. Set the vessel on the fire again, that the liquor may boil; then remove it from the fire, take out the chicken, and immediately chop its flesh into little pieces: put these into the liquor again, set it over the fire, and as soon as it boils up, pour out the broth, first carefully taking off the scum.

Here all the circumstances subservient to the perfection of the broth are carefully set down: and even plain chicken-broth, for the use of the sick, ought to be made in a similar manner.

This seems to be one of the best preparations of the viper; all the benefit that can be expected from that animal being by this means obtained. It is very nutritious and restorative food: continued for a length of time, it has sometimes done good service in leprous and other obdurate cutaneous diseases. The dried flesh of the vipers brought from abroad is not at all superior to the fresh vipers of our own country; the wines and tincture of the animal, probably, have little virtue; the volatile salt, however strongly recommended by

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some, does not appear to differ from that producible from every animal-substance.

350. Decoction of feneka. E.

Take of feneka, rattlesnake root, one ounce; water, a pint and a half. Boil to one pint, and strain.

The virtues of this decoction will be easily understood from those of the root which it is prepared from. The dose, in hydropic cases, and rheumatic or arthritic complaints, is two ounces; to be repeated three or four times a-day, according to its effect.

351. The common fomentation. L.

Take of abrotanum leaves dried, sea-wormwood tops dried, camomile-flowers dried, each one ounce; bay-leaves dried, half an ounce; water, six pints. Lightly boil them, and strain out the decoction for use.

It is left to the choice of the apothecary to take either the male or female abrotanum, that is, southernwood or lavender-cotton: which, though differing from one another, in some respects may be looked upon as similar with regard to the purposes for which this composition is intended: nor indeed can either of them give much assistance to camomile-flowers and wormwood. The use of this decoction is expressed in its title: spirit of wine, which is commonly added in fomentations, is left to be directed by the prescriber, in such quantity as particular cases may require.

352. The common decoction for glysters. L.

Take of mallow-leaves dried, one ounce; camomile flowers dried, sweet fennel-seeds, each half an ounce; water, one pint. Boil them together, and strain out the decoction for use.

The title of this decoction sufficiently expresses its use, as the basis of glysters.

353. The common decoction. E.

Take of camomile-flowers, one ounce; carway-seeds, half an ounce; water, two quarts. Boil for a quarter of an hour, and then strain out the liquor.

This decoction is intended to answer the purposes of both the foregoing. It is less loaded with ingredients than either, but not perhaps for that reason the less useful.

§ 2. WHEYS.

356. Mustard-whcy.

Take milk and water, of each a pint; bruised mustard-seed, an ounce and a half. Boil them together till the curd is perfectly separated; afterwards strain the whey through a cloth.

This is the most elegant, and by no means the least efficacious method of exhibiting mustard. It warms and invigorates the habit, and promotes the different secretions. Hence, in the low state of nervous fevers, it will often supply the place of wine. It is also of use in the chronic rheumatism, palsy, dropy, &c. The addition of a little sugar will render it more agreeable. — The dose is an ordinary tea-cupful four or five times a-day.

357. Alum-whcy.

Boil two drams of powdered-alum in a pint of milk

till it is curdled; then strain out the whey.

This whey is beneficial in an immoderate flow of the menses, and in a diabetes or excessive discharge of urine. — The dose is two, three, or four ounces, according as the stomach will bear it, three times a-day. If it should occasion vomiting, it may be diluted.

583. Scorbutic whey.

This whey is made by boiling half a pint of the scorbutic juices in a quart of cow's milk. More benefit, however, is to be expected from eating the plants than from their expressed juices.

The scorbutic-plants are, bitter-oranges, brooklime, garden scurvy-grafs, and water-creffes.

§ 3. VINEGARS.

359. VINEGAR extracts the virtues of several medicinal substances in tolerable perfection: but at the same time its acidity makes a notable alteration in them, or superadds a virtue of a different kind; and hence it is more rarely employed in this intention than purely aqueous or spirituous menstrua. Some drugs, however, vinegar, for particular purposes, excellently assists or coincides with, as squills, garlic, ammoniacum, and others: and in many cases, where this acid is itself principally depended on, it may be advantageously impregnated with the flavour of certain vegetables; most of the odoriferous flowers impart to it their fragrance, together with a fine purplish or red colour. Violets, for instance, if fresh parcels of them are infused in vinegar in the cold for a little time, communicate to the liquor a pleasant flavour, and deep purplish red colour. Vinegar, like other acids, added to watery infusions or decoctions, generally precipitates a part of what the water had dissolved.

360. Vinegar of squills.

Take of dried squills, one pound; vinegar, six pints. Macerate the squills in the vinegar with a gentle heat; then press out the liquor, and set it by till the faeces have subsided: the vinegar being afterwards poured off, add to it about one-twelfth its quantity of proof-spirit, that it may keep the longer from growing mothery. *L.*

Take of the dried root of squills, four ounces; distilled vinegar, two pints; proof-spirit, two ounces. Macerate the root with the vinegar for eight days; then add the spirit; and when the faeces have subsided, pour off the clear liquor. *E.*

This is a medicine of great antiquity: we find, in a treatise attributed to Galen, an account of its preparation, and of many particular virtues then ascribed to it. It is a very powerful stimulant, aperient, and attenuant of tenacious juices; and hence is frequently used with good success in disorders of the breast occasioned by a load of thick viscid phlegm, for promoting urine in hydropic cases, &c. The dose of this medicine is from a dram to half an ounce. Where crudities abound in the first passages, it may be given at first in a larger dose, to evacuate them by vomit. It is most conveniently exhibited along with cinnamon or other agreeable aromatic waters, which prevent the nausea it would otherwise, even in small doses, be apt to occasion.

§ 4. WINES.

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361. The original intention of medicated wines was, that medicines, which were to be continued for a length of time, might be taken in the most familiar and agreeable form; by this means a course of remedies was complied with, notwithstanding the repugnance and aversion which the sick often manifest to those directly furnished from the shops; and hence the inferior sort of people had their medicated ales. Nevertheless, as vinous liquors excellently extract the virtues of several simples, and are not ill fitted for keeping, they have been employed as official menstrua also; and substances of the greatest efficacy are trusted in this form. As compounds of water and inflammable spirit, they take up such parts of vegetables and animals as are soluble in those liquors; though moist of them abound at the same time with a mucilaginous or viscous substance, which renders them less effectual menstrua than purer mixtures of water and spirit. They contain likewise a feeble acid, which somewhat further obstructs their action on certain vegetable and animal matters, but enables them, in proportion to its quantity, to dissolve some bodies of the metallic kind, and thus impregnate themselves with the corroborating virtues of steel, the alterative and emetic powers of antimony, and the noxious qualities of lead.

Note. To all the medicated wines, after they have been strained, you may add about one-twentieth their quantity of proof-spirit to preserve them from fermentation. They may be conveniently kept in the same kind of glass-bottles that wines generally are for common uses, which should likewise be corked with the same care. *L.*

362—364. *Alkaline aloetic wine. L.*

Take of any fixed alkaline salt, eight ounces; focolatine aloes, saffron, myrrh, each one ounce; sal ammoniac purified, six drams; mountain wine, two pints. Macerate without heat for a week or longer; then filter the wine through paper.

This is the *elixir proprietatis Helmontii*, with some little variations which affect the compounder rather than the composition.

Helmont and others have entertained a very high opinion of this medicine, and looked upon it as “a vivifying and preserving balsam, capable of continuing health and prolonging life to the utmost possible limits.” The medicine is doubtless a very efficacious and useful one for many purposes: it may be so managed as to attenuate viscid juices and open obstructions in the remoter parts, and promote evacuation by almost all the emunctories. In doses of one, two, or three drams, it increases the urinary secretion; and if the patient is kept moderately warm, generally proves diaphoretic or sudorific; in larger doses, it gently loosens the belly.

365, a. *Bitter wine. L.*

Take of gentian root, yellow rind of lemon-peel, fresh, each one ounce; long pepper, two drams; mountain wine, two pints. Macerate without heat, and strain out the wine for use.

This is a very elegant bitter, which the addition of the long pepper renders considerably warmer than the

watery infusion. Gentian and lemon-peel, as we have already seen, make a bitter of a very grateful flavour. “The spice here added was selected after the trial of many other materials.”

365, b. *Bitter wine. E.*

Take of gentian root, half an ounce; Peruvian bark, one ounce; dried orange-peel, two drams; canella alba, one dram; proof-spirit, four ounces; white-wine, two pints. First pour on the proof-spirit, then the wine; macerate four days, and strain.

This wine supplies the place of the stomachic tincture of the former pharmacopœia.

366. *Antimonial or emetic wine.*

Take of crocus of antimony, washed, one ounce; mountain wine, a pint and a half. Digest without heat, and filter the wine through paper. *L.*

Take of glass of antimony, levigated, one ounce; white wine, one pint. Digest for three days, shaking the mixture now and then, and filter the liquor through paper. *E.*

The antimonial wine possesses the whole virtues of that mineral, and may be so dosed and managed as to perform all that can be effected by any antimonial preparation; with this advantage, that as the active part of the antimony is here already dissolved and rendered miscible with the animal-fluids, its operation is more certain. Given from 10 to 50 or 60 drops, it acts generally as an alterative and diaphoretic; in larger doses, as a diuretic and cathartic; whilst three or four drams prove for the most part violently emetic. It has been chiefly used in this last intention, in some maniacal and apoplectic cases; and hence gained the name of *emetic wine*.

367. *Steel-wine.*

Take of iron filings, four ounces; cinnamon, mace, each half an ounce; Rhenish wine, four pints. Macerate without heat for a month, frequently shaking the vessel; then strain off the wine for use. *L.* Take of iron-filings, three ounces; cochineal, half a dram; Rhenish wine, two pints. Digest them together for twenty days, frequently shaking the vessel; and then pass the wine through a filter. *E.*

Both these wines are sufficiently elegant ones. Rhenish is an excellent menstruum for steel, and dissolves a considerable quantity of it: the cochineal, in the second, imparts a fine colour; and the spices, in the first, give the liquor an agreeable flavour, make it sit easier on the stomach, and likewise promote its medicinal efficacy.

368. Steel-wine is a very useful preparation of this metal, and frequently exhibited in chlorotic and other indispositions where chalybeates are proper. Boerhaave recommends it as one of the noblest medicines he was acquainted with, for promoting that power in the body by which blood is made, when weakened by a bare debility of the over-relaxed solids, and an indolent, cold, aqueous indisposition of the juices; for in this case, says he, no virtue of any vegetable or animal substance, no diet or regimen can effect that, which is effected by iron; but it proves hurtful where the vital powers are already too strong, whether this proceeds

ceeds from the fluids or the solids. The dose is from a dram to half an ounce; which may be repeated two or three times a-day.

369. *Saffron-wine.* L.

Take of saffron, one ounce; canary, one pint. Macerate without heat, and strain off the wine.

Canary has been objected to by some as an improper menstruum for medicinal simples, since it contains a large quantity of unctuous matter, which impedes its dissolving power: a pint of this sort of wine left, upon evaporation, two ounces of a mellaginous substance, not unlike honey boiled hard. It is nevertheless, for saffron, a very well adapted menstruum, as not only sufficiently loading itself with its virtues, but likewise coinciding in the general intention of the medicine, that of a cordial. The preparation made with Canary is also better fitted for keeping than when wines that have any tendency to acidity are employed; for tinctures of saffron drawn with these last soon lose their fine colour; whilst those made with the first retain it for a much longer time. The dose of this tincture is from one dram to three or more.

370. *Wine of ipecacuanha.* L.

Take of ipecacuanha, two ounces; yellow rind of Seville orange-peel, dried, half an ounce; Canary, two pints. Macerate without heat, and strain out the wine.

371. *Tincture of ipecacuanha.* E.

Take of ipecacuanha in powder, one ounce; mountain wine, one pint. After three days digestion, let the tincture be filtered for use.

Both these wines are very mild and safe emetics, and equally serviceable in dysenteries also, with the ipecacuanha in substance; this root yielding nearly all its virtues both to the mountain and Canary wines here ordered, as it does a good share of them even to aqueous liquors. The common dose is an ounce, more or less, according to the age and strength of the patient.

372. *Viper-wine.* L.

Take of dry vipers, two ounces; mountain, three pints. Macerate with a gentle heat for a week; and then strain off the wine.

It has been disputed, whether live or dry vipers are preferable for making this medicine: such as are moderately and newly dried, are perhaps the most eligible, since, by exsiccation, they seem to lose only their phlegmatic or aqueous parts. Whether they communicate to the wine, either when used fresh or dry, so much virtue as they are supposed to do, is greatly to be doubted. Some compositions under this name have been highly celebrated, as restoratives, in debilities and decays of constitution; but what virtues of this kind they possessed, were supplied chiefly from other ingredients.

373. *Wine of millepedes.* E.

Take of live millepedes, bruised, two ounces; Rhenish wine, one pint. Pour the wine on the millepedes bruised a little; infuse for twelve hours, and strain

off the liquor, and squeeze it out from the residuum.

This wine has been commended as an admirable cleanser of all the viscera, yielding to nothing in the jaundice and obstructions of the kidneys or urinary passages, of excellent service in almost all chronic distempers, even in serophulous and stumous swellings, and in desfluxions of rheum upon the eyes. But those who expected these extraordinary virtues from it, have often been deceived; and at present there are few who have any great dependence on it. It is directed to be given from half an ounce to two ounces.

374. *Cephalic tincture.* E.

Take of wild valerian root, four ounces; Virginian snakeroot, one ounce; rosemary tops, half an ounce; French white-wine, six pints. Digest them together for three days, and then filter the tincture.

This preparation promises to be a medicine of considerable utility as a cephalic, that is, in disorders of the nervous system, wherein the membranes of the brain are often principally affected, as in vertiginous, epileptic, and paralytic complaints.

375. *Vinous tincture of rhubarb.* L.

Take of rhubarb, two ounces; lesser cardamom seeds, freed from the husks, half an ounce; saffron, two drams; mountain wine, two pints. Macerate without heat, and then strain off the tincture.

This is a warm, cordial, laxative medicine. It is used chiefly in weakness of the stomach and bowels, and some kinds of looseness, for evacuating the offending matter, and strengthening the tone of the viscera. It may be given from half a spoonful to three or four spoonfuls or more, according to the circumstances of the disorder, and the purposes it is intended to answer.

376. *Tinctura sacra.*

Take of socotorine aloes, eight ounces; canella alba, two ounces; mountain wine, ten pints. Reduce the aloes and canella separately into powder; then mix, and pour on them the wine; afterwards macerate without heat, for a week or longer, occasionally shaking the vessel; lastly, strain off the wine. It will be convenient to mix with the powders some white sand, well washed from dirt, to prevent the aloes from concreting, which it is apt to do upon being moistened. L.

Take of socotorine aloes in powder, one ounce; Ginger, Jamaica pepper, each one dram; mountain wine, a pint and a half. Digest for seven days, shaking the mixture now and then, and then strain off the tincture. E.

This medicine has long been in great esteem, not only as a cathartic, but likewise as a stimulus; the wine dissolving all that part of the aloes in which these qualities reside, a portion only of the less active resinous matter being left. The aromatic ingredients are added to warm the medicine, and somewhat alleviate the ill flavour of the aloes: canella alba, or cloves, are said, among numerous materials that have been made trial of, to answer this end the most successfully.

The tinctura sacra appears from long experience,

to be a medicine of excellent service in languid, phlegmatic habits, not only for cleansing the primæ viæ, but likewise for attenuating and dissolving viscid juices in the remoter parts, for stimulating the solids, warming the habit, promoting or exciting the uterine purgations, and the hæmorrhoidal flux. The dose, as a purgative, is from one to two ounces, or more: it may be introduced into the habit, so as to be productive of excellent effects as an alterant, by giving it in small doses at proper intervals: thus managed, it does not for a considerable time operate remarkably by stool; but at length proves purgative, and occasions a lax habit of much longer continuance than that produced by the other common cathartics.

377. *Thebaic tincture.* L. [See n° 418.]

Take of strained opium, two ounces; cinnamon, cloves, each one dram; mountain wine, one pint. Macerate without heat for a week, and then filter the tincture through paper.

This is the liquid laudanum of Sydenham, with the exchange of Canary wine for mountain, and the omission of an ounce of saffron. The aromatics in the form above are in so small quantity, that the prescriber can scarce expect any considerable effect from them, the proportion of each that goes to a grain of opium, amounting to no more than the sixteenth part of a grain: even these minute proportions, however, are in good measure sufficient to take off the ill odour of the opium; which seems to be all that is intended by them.

378, 379. The principal advantages of exhibiting opium in this form are, that by being already dissolved, it exerts itself the sooner in the body; and that by some persons, liquids are more commodiously taken, than a bolus or pill. The common doses of the tincture are from ten drops to forty, fifty, or more, according to the exigencies of the case. It were to be wished, that the dose could be more exactly ascertained, by weight or measure: as the drops may, according to different circumstances, vary in quantity, though in number the same; and as an error therein may, in some cases, be of mischievous consequences. Twenty drops contain at a medium about one grain of opium, or rather so much as that quantity of wine will extract from one grain; for the liquor does not dissolve the whole substance of the opium, nor is the solution equivalent in its effect to the full quantity of opium employed in it.

A liquid opiate, free from the inconveniencies here complained of, will be described under the head of spirituous tinctures.

380. *White dittany wine.* E.

Take of white dittany root, one ounce; iron filings free from rust, three drams; white wine, one pint. Digest 25 hours, and then strain of the liquor.

§ 5. ALES.

381. THERE are two ways of impregnating malt-liquors with the virtues of medicinal substances: Macerating the subject in the liquor after the fermentation is completely finished; and fermenting it along with the liquor, or at least adding it towards the end of the fermentation, that, by the resolute power

of that process, its texture may be opened, and its medicinal parts more fully extracted. Neumann observes, that the active powers of many vegetables are not only effectually extracted, but extended, as it were, by fermentation: that so much pounded nutmeg as will lie on the point of a knife, gives a flavour to a large vat of fermenting ale; whereas, when the fermentation is finished, the quantity of liquor to which it gives a like impregnation, is comparatively inconsiderable.

As the medicinal ales are chiefly intended for diet-drinks, it is not necessary to be very exact with regard to their doses. In general, they may be taken to a pint or more in the day, and continued as long as necessary. They should not, however, be long used at a time, as all bitters are apt to affect the head when their use is protracted.

382. *Antiscorbutic ale.*

Take of horse-radish root, fresh, one pound; great water-dock root, sliced and dried, two pounds; water-trefoil, dried, four ounces. Infuse them in ten gallons of new ale.

In scorbutic disorders, this ale, used as common drink, generally does service.

383. *Bitter ale.*

Take of gentian root, four ounces; lemon peel, three ounces; canella alba, two ounces; ale, two gallons. Let the ingredients be cut small, and steeped in the ale without heat.

This is an agreeable stomachic ale, superior to the common purls and most other preparations of that kind.

384. *Diuretic ale.*

Take of mustard-seed and juniper-berries, each eight ounces; seeds of the wild carrot, six ounces; new small ale, ten gallons.

In gravelly complaints, and dropical habits, this is an useful diet-drink.

385. *Opening ale.*

Take of fena, four ounces; tops of lesser centaury, and wormwood, each three ounces; of fucotrine aloes, half an ounce. Infuse in ten gallons of ale.

Half a pint of this ale may be taken twice a-day, or oftener if necessary, to keep the body open.

386. *Dr Butler's ale.*

Take of betony, sage, agrimony, garden scurvy-grass, Roman wormwood, each three handfuls; elecampane roots, each four ounces; new ale, four gallons. The herbs and roots are to be put in a bag, and hung in the ale while it works.

This liquor has so far obtained among the common people, as to have been frequently made and sold in public houses. It is used in the spring, for purifying the blood, and preventing scorbutic disorders.

387. *Cephalic ale.*

Take of wild valerian root, ten ounces; mustard seed, whole, six ounces; Virginian snakeroot, two ounces; rosemary, or sage, three ounces; new small ale, ten gallons.

The ingredients of this composition are all of the warm and stimulating kind; and consequently tend to invigorate the nervous system, and promote the circulation of the fluids. In palsies, epilepsies, and vertigoes, some benefit may be expected from this liquor used as common drink.

§ 6. SPIRITUOUS TINCTURES.

388. RECTIFIED spirit of wine is the direct menstruum of the resins and essential oils of vegetables; and totally extracts these active principles from sundry vegetable matters, which yield them to water either not at all, or only in part. It dissolves likewise the sweet saccharine matter of vegetables; and generally those parts of animal-bodies in which their peculiar smells and tastes reside.

389. The virtues of many vegetables are extracted almost equally by water and rectified spirit; but in the watery and spirituous tinctures of them there is this difference, that the active parts in the watery extractions are blended with a large proportion of inert gummy matter, on which their solubility in this menstruum in great measure depends, while rectified spirit extracts them almost pure from gum. Hence, when the spirituous tinctures are mixed with watery liquors, a part of what the spirit had taken up from the subject generally separates and subsides, on account of its having been freed from that matter which, being blended with it in the original vegetable, made it soluble in water. This, however, is not universal; for the active parts of some vegetables, when extracted by rectified spirit, are not precipitated by water, being almost equally dissolvable in both menstrua.

390. Rectified spirit may be tinged by vegetables of all colours, except blue: the leaves of plants in general, which give out but little of their natural colour to watery liquors, communicate to spirit the whole of their green tincture, which for the most part proves elegant, though not very durable.

Fixed alkaline salts deepen the colour of spirituous tinctures; and hence have been supposed to promote the dissolving power of the menstruum, tho' this does not appear from experience: in the trials that have been made to determine this affair, no more was found to be taken up in the deep-coloured tinctures than in the paler ones, and often not so much: if the alkali be added after the extraction of the tincture, it will heighten the colour as much as when mixed with the ingredients at first. Nor is the addition of these salts in making tinctures useful only, but likewise prejudicial, as they in general injure the flavour of aromatics, and superadd a quality sometimes contrary to the intention of the medicine.—Volatile alkaline salts, in many cases, promote the action of the spirit. Acids generally weaken it, unless when the acid has been previously combined with the vinous spirit into a compound of new qualities, called *dulcified spirit*.

391. General rules for extracting tinctures.

- I. The vegetable substances ought to be moderately and newly dried, unless they are expressly ordered otherwise. They should likewise be cut and bruised before the menstruum is poured on them.
- II. If the digestion is performed in balneo, the whole

success depends upon the proper management of the fire: it ought to be all along gentle, unless the hard texture of the subject should require it to be augmented; in which case the heat may be increased, so as to make the menstruum boil a little towards the end of the process.

III. Very large circulatory vessels ought to be employed for this purpose, which should be heated before they are luted together.

Circulatory vessels are those which are so contrived, and of such a height, that the vapour which arises during the digestion may be cooled and condensed in the upper part, and fall down again into the liquor below: by this means the dissipation both of the spirit and of the volatile parts of the ingredients is prevented. They are generally composed of two long-necked matrases or bolt-heads; the mouth of one of which is to be inserted into that of the other, and the juncture secured by a piece of wet bladder. The use of heating the vessels is, to expel a part of the air; which otherwise, rarefying in the process, would endanger bursting them or blowing off the uppermost matras. A single matras with a long neck, or with a glass-pipe inserted into its mouth, is more commodious than the double vessel. See 182.

IV. The vessel is to be frequently shaken during the digestion.

V. All tinctures should be suffered to settle before they are committed either to the filter or strainer.

VI. In the tinctures (and distilled spirits likewise) designed for internal use, no other spirit (drawn from malt, melasses, or other fermented matter) is to be used than that expressly prescribed.

VII. Resin and resinous gums yield tinctures more successfully, if, after being ground into powder, they be mixed with some white sand well washed and dried, which will prevent their running into lumps by the heat. If the powders prescribed are sufficient for this purpose, such an addition is unnecessary.

392. Bitter tincture. L.

Take of gentian root, two ounces; yellow rind of Seville orange-peel, dried, one ounce; lesser cardomom-seeds, freed from the husks, half an ounce; proof-spirit, two pints. Digest without heat, and strain off the tincture.

393. Bitter tincture, or stomachic elixir. E.

Take of gentian root, two ounces; dried orange-peel, an ounce; canella alba, half an ounce; cochineal, half a dram; French brandy, two pints. Let them steep for four days, and then filter the elixir.

Both this and the preceding composition are very useful stomachic bitters.

394. Tincture of wormwood. E.

Take of the dried tops of wormwood in flower, four ounces; rectified spirit of wine, two pints. Macerate for two days; and strain the liquor, pressing it out from the residuum; then pour it upon other two ounces of wormwood; macerate again for four days, and press through a linen-cloth; and lastly, filter the liquor.

395. Aromatic

395. *Aromatic tincture.*

Take of cinnamon, six drams; lesser cardomom-seeds, freed from the husks, three drams; long-pepper, ginger, each, two drams; proof-spirit, two pints. Digest without heat, and then strain off the tincture. L.

Take of cinnamon, six drams; lesser cardomom-seeds, an ounce; angelica seeds, three drams; long-pepper, two drams; proof-spirit, two pints. Macerate for seven days; and then filter. E.

This is a very warm aromatic, too much so to be given without dilution. A teaspoonful or two may be taken in wine, or any other convenient vehicle, in languors, weaknels of the stomach, flatulencies, and other like complaints. The *stomachic tincture*, described hereafter, is similar in intention to this; but contrived less hot of the spices, that it may be taken by itself.

396. *Balsamic tincture.*

Take of balsam of copaiba, one ounce and a half; balsam of Peru, half an ounce; English saffron, one dram; rectified spirit of wine, one pint. Digest these ingredients together, in a sand-heat, for three days; and then pass the tincture through a strainer.

This tincture is an excellent balsamic, both for internal and external purposes. It is usually given, in doses of 10, 20, or 30 drops, in the fluor albus, gleet, cachexies, some kinds of asthma and nephritic complaints, for strengthening the tone of the viscera, and corroborating the nervous system in general. Some caution is requisite in the use of these refinous warm medicines: in cold, languid, phlegmatic habits, they have for the most part good effects; but in bilious and plethoric constitutions, where there is any tendency to inflammation or immoderate heat, they are manifestly prejudicial, and raise or continue febrile symptoms.

397. *Tincture of cantharides.*

Take of cantharides, bruised, two drams; cochineal, half a dram; proof-spirit, a pint and a half. Digest them together; and afterwards filter the tincture through paper. L.

Take of cantharides, two drams; rectified spirit of wine, a pint and a half. Digest for four days, and then filter the tincture. E.

These tinctures possess the whole virtues of the fly, and are the only preparations of it designed for internal use; tinctures being by far the most commodious and safe form for the exhibition of this active drug. The usual dose of these tinctures is from 10 to 20 drops, which may be taken in a glass of water, or any other more agreeable liquor, twice a-day, and increased by two or three drops at a time, according to the effect.

398. *Tincture of cardomoms.*

Take of lesser cardomom-seeds, hulked, half a pound; proof-spirit, two pints. Digest without heat, and strain the tincture. L.

Take of lesser cardomom-seeds, six ounces; proof-spirit, two pints. Macerate for eight days; and then filter. E.

Tincture of cardomoms has been in use for a considerable time, though but lately received into the dispensatory. It is a pleasant, warm cordial, and may be taken, along with any proper vehicle, from a dram to a spoonful or two.

398. *Tincture of castor.*

Take of Russia castor, powdered, two ounces; proof-spirit, two pints. Digest for ten days without heat, and strain off the tincture. L.

Take of Russia castor, an ounce and a half; rectified spirit of wine, one pint. Digest them for six days, and afterwards strain out the liquor. E.

400. *Compound tincture of castor.* E.

Take of Russia castor, one ounce; asafetida, half an ounce; vinous spirit of sal ammoniac, one pint. Digest for six days in a close-stopped phial, and then strain the tincture.

This composition is a medicine of real efficacy, particularly in hysterical disorders, and the several symptoms which accompany them. The vinous spirit of sal ammoniac, now used instead of the volatile oily spirit prescribed, is an excellent menstruum both for the castor and the asafetida, and greatly adds to their virtues.

401. a. *Tincture of cinnamon.* L. E.

Take of cinnamon, an ounce and a half; proof-spirit, a pint. Digest without heat; and strain off the tincture.

The tincture of cinnamon possesses the restringent virtues of the cinnamon, as well as its aromatic cordial ones; and in this respect it differs from the distilled waters of the spice.

401. b. *Volatile tincture of guaiacum.* L.

Take of gum guaiacum, four ounces; volatile aromatic spirit, a pint and a half. Digest, without heat, in a vessel close stopped; and afterwards let the tincture be passed through a strainer.

This is a very elegant and efficacious tincture; the volatile spirit excellently dissolving the gum, and at the same time promoting its medicinal virtue. In rheumatic cases, a tea-spoonful, taken every morning and evening in any convenient vehicle, has proved of singular service.

402. *Simple tincture of Peruvian bark.* L. E.

Take of Peruvian bark, four ounces; proof-spirit, two pints. Digest and strain.

A medicine of this kind has been for a long time pretty much in esteem, and usually kept in the shops, though but lately received into the dispensatory.

For general use, this is the most convenient of the bark-tinctures, the proof-spirit extracting nearly all the virtues of the bark. It may be given from a tea-spoonful to half an ounce, or an ounce, according to the different purposes it is intended to answer.

403. *Volatile tincture of Peruvian bark.* L.

Take of Peruvian bark, four ounces; spirit of sal ammoniac, two pints. Digest without heat in a vessel close stopped; and afterwards strain the tincture.

This tincture is but lightly impregnated with the virtues.

virtues of the bark; and is so acrimonious, that the largest dose which can with safety be given of it, can contain only a very small quantity of the subject. The medicine nevertheless has its uses, and may be serviceable in some cases where the stronger are improper, as in difficulty of breathing, obstructions, and oppressions of the breast. Stronger tinctures of this kind may be obtained by means of dulcified spirit of sal ammoniac, or the spirit prepared with quicklime. All the three may be employed where a large quantity of bark is not required, as at the close of the cure of intermittents; in weakness of digestion, attended with a cold sensation at the stomach; and some fluxes, particularly those from the uterus, where the circulation is languid, the fibres relaxed, and where there is a periodical return of slight febrile complaints. In these cases, Dr Lewis says he has often experienced salutary effects from a tincture in dulcified spirit of sal ammoniac, given to the quantity of a teaspoonful five or six times a-day, in any appropriated vehicle.

404. *Compound tincture of Peruvian bark.* E.

Take of Peruvian bark, in powder, three ounces; Virginian snakeroot, gentian, each two drams; French brandy, two pints. Let them steep together for three days, and afterwards filter the tincture.

The substances here joined to the bark, in many cases, promote its efficacy in the cure of intermittents; and not unfrequently, are absolutely necessary. In some ill habits, particularly where the juices are sluggish and tenacious, the viscera and abdominal glands obstructed, the bark by itself proves unsuccessful, if not injurious; whilst given in conjunction with corroborant stomachics and deobstruents, it rarely fails of the due effect. Gentian and Virginian snakeroot, are among the best additions for this purpose; to which it is often necessary to join chalybeate medicines also.

405. *Tincture of saffron.* E.

Take of English saffron, one ounce; French brandy, one pint. After digesting them for five days, let the tincture be filtered out for use.

This tincture is similar in virtue to the saffron-wine, n° 368. A spirituous menstruum is here preferred to the wine, as a tincture drawn with the former retains its elegant colour longer, and is not apt to deposit in keeping any part of what it had taken up from the saffron.

406. *Tincture or essence of white dittany.* E.

Take of fresh dittany root, two ounces; rectified spirit of wine, 14 ounces. Digest for eight days, and filter.

407. *Fetid tincture.* E.

Take of asafetida, two ounces; vinous spirit of sal ammoniac, one pint. Macerate for six days in a close-stopped phial, and strain.

This tincture possesses the virtues of the asafetida itself, and may be given from 10 drops to 50 or 60.

408. *Tincture of foot.*

Take of wood-foot, two ounces; asafetida, one ounce; proof-spirit, two pints. Digest and strain. L.

Take of shining wood foot, one ounce; asafetida, half

an ounce; French brandy, a pint. Digest for six days, and strain. E.

Prepara-
tions.

These medicines are found serviceable, not only in hysterical cases, but likewise in other nervous disorders. They may be given from a tea spoonful to a common spoonful twice a day.

409. *Tincture of jalap.*

Take of jalap-root, eight ounces; proof-spirit, two pints. After proper digestion, strain off the tincture. L.

Take of jalap, in coarse powder, three ounces; French brandy, one pint. Digest them for eight days, and strain the tincture. E.

This tincture is an useful and mild purgative, the menstruum here employed taking up so much of the gummy parts as corrects the griping quality which the resin is attended with. It may be taken by itself from a dram to half an ounce; or mixed in smaller quantity with cathartic infusions, or the like.

410. a. *Tincture of Kino.*

Take of gum kino, two ounces; proof-spirit, one pint. Digest for eight days, and strain.

410. b. *Japanese tincture.* L. E.

Take of Japan earth, three ounces; cinnamon, two ounces; proof spirit, two pints. After proper digestion, let the tincture be passed through a strainer.

This tincture is of good service in all kinds of desfluxions, catarrhs, loosenesses, uterine fluors, and other like disorders, where mild astringent medicines are indicated. Two or three teaspoonfuls may be taken every now and then, in red wine, or any other proper vehicle.

411. *Tincture of gum-lac.* E.

Take of gum-lac, powdered, an ounce; Myrrh, powdered, half an ounce; spirit of scurvygrass, a pint and a half. Digest in a sand-heat for six days; after which strain off the tincture for use.

This tincture is principally employed for strengthening the gums, and in bleedings and scorbutic exulcerations of them: it may be fitted for use in these intentions, by mixing it with honey of roses, or the like. Some recommend it internally against scorbutic complaints, and as a corroborant in gleets, female weaknesses, &c. Its warmth, pungency, and manifestly astringent bitterish taste, point out its virtues, in these cases, to be considerable; though common practice among us has not yet received it.

412. *Tincture of the martial flowers.* L.

Take of martial flowers, four ounces; proof-spirit, one pint. Digest and strain.

413. a. *Tincture of iron.* E.

Take of the scales of iron, prepared and reduced to powder, three ounces; muriatic acid, as much as is sufficient for dissolving the powder. Digest with a great heat; and when the iron is totally dissolved, add as much spirit of wine as will make the whole two pounds by measure.

413. *b. Tincture of iron in spirit of salt.* L.

Take of iron filings, half a pound; Glauber's spirit of salt, three pounds; rectified spirit of wine, three pints. Digest the iron filings in the spirit of salt, without heat, as long as the spirit acts upon the iron; after the fæces have subsided, evaporate the liquor to one pound, and add thereto the vinous spirit.

All these tinctures are greatly preferable to the calces or croci of iron, as being not only more speedy, but likewise more certain, in their operation: the latter, in some cases, pass off through the intestinal tube with little effect; whilst the tinctures scarce ever fail. From 10 to 20 drops of either of the tinctures, may be taken two or three times a-day, in any proper vehicle; though it is seldom advisable to extend the dose so far as the last of these quantities, especially in regard to the tincture in the spirit of salt, which is exceeding strong of the iron.

414. *Tincture of meconium.* E.

Take of opium, two drams; simple Jamaica pepper-water, 20 ounces by weight; rectified spirit of wine, 10 ounces by weight. Having rubbed the opium well with the water, add the spirit, digest for eight days, and then filter through paper.

415. *Tincture of melampodium, or black hellebore.* L. E.

Take of black hellebore roots, four ounces; cochineal, two scruples; proof-spirit, two pints. Digest them together, and afterwards filter the tincture through paper.—The Edinburgh college orders only half a dram of cochineal, and desires the digestion to be continued for eight days.

This is perhaps the best preparation of hellebore when designed for an alterative, the menstruum here employed extracting the whole of its virtues. It has been found, from experience, particularly serviceable in uterine obstructions; in sanguine constitutions, where chalybeates are hurtful, it seldom fails of exciting the menstrual evacuations, and removing the ill consequences of their suppression. So great is the power of this medicine, that wherever, from an ill conformation of the parts, or other causes, the expected discharge does not succeed upon the use of it, the blood, as Dr Mead has observed, is so forcibly propelled, as to make its way through other passages. A tea-spoonful of the tincture may be taken twice in a day in warm water, or any other convenient vehicle.

416. *Tincture of musk.* L.

Take of musk, two drams; rectified spirit of wine, one pint. Digest for ten days, and strain.

417. *Tincture of myrrh.*

Take of myrrh, three ounces; proof spirit, two pints. After due digestion, strain off the tincture. L.
Take of myrrh in powder, an ounce and a half; rectified spirit of wine, a pint. Digest for ten days; then strain off the tincture for use. E.

Tincture of myrrh is recommended internally for warming the habit, attenuating viscid juices, strengthening the solids, opening obstructions, particularly those of the uterine vessels, and resisting putrefaction. Boerhaave greatly esteems it in all languid cases pro-

ceeding from simple inactivity; in those female disorders which are occasioned by an aqueous, mucous, sluggish indispotion of the humours, and a relaxation of the vessels; in the fluor albus, and all diseases arising from a like cause. The dose is from 15 drops to 40 or more. The medicine may doubtless be given in these cases to advantage; tho' with us it is more commonly used externally, for cleansing foul ulcers, and promoting the exfoliation of carious bones.

418. *Thebaic tincture, commonly called liquid laudanum.* E.

Take of opium, two ounces; spirituous cinnamon-water, 20 ounces. Digest for four days, and filter.

This is a very elegant liquid opiate; the menstruum dissolving nearly the whole substance of the opium, and effectually covering its ill flavour. The usual dose is from 15 to 25 or 30 drops.

419. *a. Tincture of rhubarb.* E.

Take of rhubarb, three ounces; lesser cardamom-seeds, half an ounce; proof-spirit two pints. Digest for seven days, and strain.

b. Spirituous tincture of rhubarb. L.

Take of rhubarb, two ounces; lesser cardamom seeds, hulled, half an ounce; saffron, two drams; proof-spirit, two pints. Digest without heat, and strain off the tincture for use.

c. Bitter tincture of rhubarb. E.

Take of rhubarb, two ounces; gentian root, half an ounce; Virginian snake-root, one dram; French brandy, two pints. Digest for seven days, and then strain off the tincture.

d. Sweet tincture of rhubarb. E.

Is made by adding four ounces of sugar-candy to the simple tincture made as above directed, and strained.

All the foregoing tinctures of rhubarb are designed as stomachics and corroborants, as well as purgatives: spirituous liquors excellently extract those parts of the rhubarb in which the two first qualities reside, and the additional ingredients considerably promote their efficacy. In weakness of the stomach, indigestion, laxity of the intestines, diarrhoeas, colicky and other like complaints, these medicines are frequently of good service: the second is also, in many cases, an useful addition to the Peruvian bark, in the cure of intermittents, particularly in cachectic habits, where the viscera are obstructed. In these intentions, a spoonful or two may be taken for a dose, and occasionally repeated.

420. *a. Saturnine tincture.* L.

Take of sugar of lead, green vitriol, each two ounces; rectified spirit of wine, two pints. Reduce the salts separately into a powder; then add the spirit, and digest them together without heat: afterwards filter the tincture through paper.

b. Antiphthical tincture. E.

Take of sugar of lead, an ounce and a half; vitriol of iron, an ounce; rectified spirit of wine, a pint. Let a tincture be extracted without heat.

The reducing of the salts separately into powder,

and performing the digestion without heat, are very necessary circumstances: for if the ingredients are attempted to be pulverized together, they will grow soft and almost liquid; and if heat is made use of, scarce any tincture will be obtained.

These tinctures are sometimes given from 20 to 30 drops, for restraining immoderate secretions, particularly the colligative sweats attending hectic fevers and phthical disorders, whence the name *antiphthical tincture*. They are undoubtedly medicines of great efficacy in these cases, but too dangerous ones to be rashly ventured on. Some have supposed that they do not contain any of the sugar of lead; but experiments made for that purpose, have shown that they do: and therefore, the London college has very judiciously changed the title of their tincture into one expression, its being a preparation of lead.

421. a. *Tincture of fena. L.*

Take of raisins, stoned, 16 ounces; fena, one pound; caraway seeds, one ounce and a half; lesser cardamoms, husked, half an ounce; proof spirit, one gallon. Digest without heat, and then strain the tincture.

b. *Compound tincture of fena, commonly called elixir of health. E.*

Take of fena, two ounces; jalap-root, one ounce; coriander seeds, half an ounce; French brandy, three pints. Digest for seven days; then strain off the tincture, and add to it four ounces of powdered sugar-candy.

Both these tinctures are useful carminatives and cathartics, especially to those who have accustomed themselves to the use of spirituous liquors; they oftentimes relieve flatulent and colicky complaints, where the common cordials have little effect: the dose is from one to two ounces. Several preparations of this kind have been offered to the public, under the name of *Daffy's elixir*; the two above are equal to any, and superior to most of them.

422. *Tincture of snakeroot.*

Take of Virginian snakeroot, three ounces; proof spirit, two pints. Digest without heat, and strain off the tincture. *L.*

Take of Virginian snakeroot, two ounces; cochineal, one dram; proof spirit, two pints. Digest in a gentle heat for three days, and then strain the tincture. *E.*

The tincture of snakeroot was in the former pharmacopœia directed with the *tinctura salis tartari*; which being now expunged, it was proposed to the college to employ rectified spirit; but as the heat of this spirit prevents the medicine from being taken in so large a dose as might otherwise be, a weaker spirit was made choice of. The tincture made in this menstruum, which extracts the whole virtues of the root, may be taken to the quantity of a spoonful or more, every five or six hours.

423. *Stomachic tincture. L.*

Take of raisins, stoned, four ounces; cinnamon, half an ounce; caraway seeds, lesser cardamoms, husked, cochineal, each two drams; proof spirit, two pints. Digest without heat, and strain off the tinctures.

This is a moderately warm stomachic tincture, much more pleasant than the usquebaugh of the former pharmacopœias. It may be taken, without any vehicle, to half an ounce or an ounce, though oftener used in mixture.

424. *Styptic tincture. L.*

Take of green vitriol, calcined, one dram; French brandy (such as has acquired a yellowish tinge from the cask), two pints. Mix them together, that the spirit may grow black; then pass it through a strainer.

The title of this tincture expresses its medicinal intention. The celebrated *styptic of Helvetius*, (which is said to be the same with that of *Eaton*), differs from it no otherwise than in being more operose in composition. They are recommended both for internal use, and for restraining external hæmorrhages: their virtues do not seem to depend so much on the iron as on the menstruum, the quantity of metal dissolved being extremely small. In keeping, the iron is apt to separate, and the liquor to lose its black colour.

425. *Tincture of sulphur.*

Take of rectified spirit of wine, one pint. Hepar sulphuris (that is, a mixture of sulphur and fixed alkaline salt melted together) four ounces. Grind the hepar into powder whilst hot from the fire, add to it the spirit, and digest in a moderate heat for 24 hours; then pour off the tincture from the fæces.

The digestion may be commodiously performed in a glass receiver: put the spirit first into the vessel, and pour the hot powder upon it: then shake them together; and to prevent the exhalation of any part of the spirit during the digestion, insert a glass tube into the mouth of the receiver.

This tincture is of a rich gold colour, a hot aromatic taste, and a particular, not ungrateful smell. Its virtues are those of a warm, attenuating, aperient, and anti-acid medicine. The dose is from 10 to 60 drops. It is most commodiously taken in Canary or other rich wines.

426. *Tincture of balsam of Tolu. E.*

Take of balsam of Tolu, an ounce and a half; rectified spirit of wine, a pint. Digest in a sand-heat, until the balsam is dissolved; and then strain the tincture.

This solution of balsam of Tolu possesses all the virtues of the balsam itself. It may be taken internally, in the several intentions for which this valuable balsam is proper, to the quantity of a tea-spoonful or two, in any convenient vehicle. Mixed with the plain syrup of sugar, it forms an elegant balsamic syrup.

427. *Simple tincture of valerian. L.*

Take of wild valerian root, four ounces; proof spirit, two pints. After due digestion, strain off the tincture.

The valerian root ought to be reduced into fine powder, otherwise the spirit will not sufficiently extract its virtues. The tincture proves of a deep colour, and considerably strong of the valerian; though it has not been found to answer so well in the cure of epileptic

epileptic disorders, as the root in substance, exhibited in the form of powder or bolus. The dose of the tincture is from half a spoonful to a spoonful or more, two or three times a-day.

428. *Volatile tincture of valerian.* L.

Take of wild valerian root, four ounces; volatile aromatic spirit, two pints. Digest without heat in a vessel closely stopped, and afterwards strain off the tincture.—The Edinburgh college orders two ounces of the root to a pint of vinous spirit of sal ammoniac, and the digestion to be continued for six days in a close stopped vial.

The volatile spirit is here an excellent menstruum, and at the same time considerably promotes the virtues of the valerian, which in some cases wants an assistance of this kind. The dose may be a tea-spoonful or two.

429. *Tincture of veratrum, or white hellebore.* L. E.

Take of white hellebore root, eight ounces; proof spirit, two pints. Digest them together for ten days, and filter the tincture through paper.

This tincture is sometimes used for acuating cathartics, &c. and as an emetic in apoplectic and maniacal disorders. It may likewise be so managed, as to prove a powerful alterative and deobstruent, in cases where milder remedies have little effect. But a great deal of caution is requisite in its use: the dose, at first, ought to be only a few drops; if considerable, it proves violently emetic or cathartic.

430. *Balm of guaiacum.* L.

Take of gum guaiacum, one pound; balm of Peru, three drams; rectified spirit of wine, two pints and a half. Digest till the gum is dissolved, and then strain off the balm.

431. *Elixir of guaiacum.* E.

Take of guaiacum, in powder, one pound; balm of Peru, three drams; rectified spirit of wine, two pounds and a half. Digest for 10 days, and strain.

Both these compositions are medicines of great efficacy, and capable of answering many useful purposes. They warm and strengthen the habit, and promote insensible perspiration. Twenty or thirty drops may be taken two or three times a-day, or oftener, in any proper vehicle, in rheumatic complaints, cutaneous defecations, &c. particularly where the patient is of a cold phlegmatic temperament, and the solids weak and relaxed. In hot bilious constitutions, and tenderness or rigidity of the vessels, like other stimulating medicines, they are evidently improper.

432. *Volatile elixir of guaiacum.* L.

Take of gum guaiacum, four ounces; balm of Peru, two drams. Distilled oil of sassafras, half a dram; vinous spirit of sal ammoniac, a pound and a half. Macerate for six days in a close stopped vial, and strain.

433. *Balsamum commendatoris, Beauce de commandeur.*

Take of dry Peruvian balm, one ounce; storax in the tear, two ounces; benjamin, three ounces; fo-

cotorine aloes, myrrh, olibanum, angelica roots, St John's-wort flowers, each half an ounce; spirit of wine, two pounds eight ounces by weight. Let them stand together in the sun during the dog-days, in a glass vessel closely stopped; and afterwards strain out the balm through a linen cloth.

This balm has been inserted, with little variation, in some foreign pharmacopœias, and likewise kept a secret in private hands, under the titles of *Balsamum Persicum*, *Balsam of Berne*, *Wade's balsam*, *Friar's balsam*, *Jesuits drops*, &c. The form above is taken from the original receipt published by Pomet (*Histoire des Drogues*, edit. 2. tom. ii. p. 56.) It stands greatly recommended, externally, for cleansing and healing wounds and ulcers, for dissolving cold tumours, allaying gouty, rheumatic, and other old pains and aches; and likewise internally, for warming and strengthening the stomach and intestines, expelling flatulencies, and relieving colicky complaints. Outwardly, it is applied cold on the part with a feather; inwardly, a few drops are taken at a time, in wine or any other convenient vehicle.

434. *Traumatic or vulnerary balsam.*

Take of benzoin, three ounces; storax, strained, two ounces; balm of Tolu, one ounce; socotorine aloes, half an ounce; rectified spirit of wine, two pints. Digest, that the gums may as much as possible be dissolved; and then strain off the balm for use. L.

This is an elegant reformation of the preceding composition, considerably more simple, yet not inferior in efficacy. The balm of Tolu supplies, with advantage, the dry Peruvian balm, a drug very rare to be met with in this country: the olibanum, myrrh, and angelica roots, here omitted, were certainly superfluous in a medicine containing so much more powerful materials; and the St John's-wort flowers are as deservedly thrown out, as having little else to recommend them than prejudice or superstition.

Take of benzoin, powdered, three ounces; balm of Peru, two ounces; hepatic aloes, in powder, half an ounce; rectified spirit of wine, two pints. Digest them in a sand-heat, for the space of three days; and then strain the balm. E.

This is a further contraction of the *beaume de commandeur*, without any injury to it as a medicine, at least with regard to the purposes for which the title shews it designed. Socotorine aloes is here judiciously exchanged for the hepatic, which appears from experience to be the most serviceable in external applications.

436. *Elixir of aloes.* L.

Take of tincture of myrrh, two pints; socotorine aloes, saffron, each three ounces. Digest them together, and strain off the elixir.

437. *Elixir proprietatis.* E.

Take of tincture of myrrh, two pounds; socotorine aloes, three ounces; English saffron, two ounces. Digest for eight days, suffer the feces to subside, and pour off the clear elixir.

This is the *elixir proprietatis* of Paracelsus, improved with regard to the manner of preparation.

This medicine is greatly recommended, and not undeservedly, as a warm stimulant and aperient. It strengthens the stomach and other viscera, cleanses the first passages from tenacious phlegm, and promotes the natural secretions in general. Its continued use has frequently done good service in cachectic and icteric cases, uterine obstructions, and other like disorders; particularly in cold, pale, phlegmatic habits: where the patient is of a hot, bilious constitution, and florid complexion, this warm stimulating medicine is less proper, and sometimes prejudicial. The dose may be from 20 drops to a tea-spoonful or more, two or three times a-day, according to the purposes which it is intended to answer.

538. *Elixir proprietatis vitriolicum.* E.

Take of myrrh in powder, focotorine aloes in powder, each an ounce and a half; English saffron, one ounce; dulcified spirit of vitriol, one pint. Digest them in a sand-heat for the space of six days; and having then suffered the faeces to subside, pour off the clear elixir.

This elixir possesses the general virtues of the preceding; and is, in virtue of the menstruum, preferred to it in hot constitutions, and weaknesses of the stomach.

439. *Paregoric elixir.*

Take of flowers of benzoin, opium, strained, each one dram; camphor, two scruples; essential oil of aniseeds, half a dram; rectified spirit of wine, two pints. Digest and strain. L.

Take of flowers of benzoin, English saffron, of each three drams; opium, two drams; distilled oil of aniseed, half a dram; vinous spirit of sal. ammoniac, one pint. Digest four days in a close stopped vial, and strain. E.

This elixir is taken from *Le Mort* with the omission of three unnecessary ingredients, honey, liquorice, and alkaline salt. It was originally prescribed under the title of *elixir asthmaeticum*, which it does not ill deserve. It contributes to allay the tickling, which provokes frequent coughing; and at the same time is supposed to open the breast, and give greater liberty of breathing: the opium procures (as it does by itself) a temporary relief from the symptoms; whilst the other ingredients tend to remove the cause, and prevent their return. It is given to children against the chin-cough, &c. from five drops to 20; to adults, from 20 to 100.

440. *Acid elixir of vitriol.* L.

Take of the aromatic tincture, one pint; strong spirit called oil of vitriol, four ounces. Mix them together; and after the faeces have subsided, filter the elixir through paper.

441. In the new edition of the Edinburgh pharmacopoeia the *elixir vitrioli* is thus prepared.

Take of cinnamon, one ounce and a half; ginger, one ounce; pepper-mint leaves, dried, half an ounce; oil of vitriol, six ounces; rectified spirit of wine, two pints. Drop the oil of vitriol by little and little into the spirit of wine; and digest them together in a sand-bath, with a very gentle heat, for three days; then add the other ingredients; conti-

nue the digestion, in the same gentle heat for three days longer; and afterwards filter the tincture in a glass funnel.

These compositions are valuable medicines in weakness and relaxations of the stomach, and decays of constitution, particularly in those which proceed from irregularities, which are accompanied with slow febrile symptoms, or which follow the suppression of intermittents. They have frequently taken place after bitters and aromatics, by themselves, had availed nothing; and, indeed, great part of their virtue depends on the vitriolic acid; which, barely diluted with water, has, in these cases, where the stomach could bear the acidity, produced happy effects.

Fuller relates (in his *Medicina gymnastica*) that he was recovered by *Mynsicht's elixir* (of which the above are improved preparations) from an extreme decay of constitution, and continual reachings to vomit. They may be given from 10 to 30 or 40 drops or more, according to the quantity of acid, twice or three a-day, at such times as the stomach is most empty.

442. *Sweet elixir of vitriol.* L.

Take of the aromatic tincture, one pint; dulcified spirit of vitriol, eight ounces by weight. Mix them together.

This is designed for persons whose stomach is too weak to bear the foregoing acid elixir; to the taste, it is gratefully aromatic, without any perceptible acidity. The dulcified spirit of vitriol, here directed, occasions little or no precipitation upon adding to it the tincture.

443. The Edinburgh college directs this to be made of the same ingredients and in the same manner as the aromatic tincture, excepting that dulcified spirit of vitriol is used instead of spirit of wine.

444. *Compound elixir of myrrh.* L.

Take of extract of favin, one ounce; tincture of castor, one pint; tincture of myrrh, half a pint. Digest them together; and then strain the elixir.

This preparation is a medicine of great importance in uterine obstructions, and in hypochondriacal cases; though, possibly, means might be contrived of superadding more effectually the virtues of favin to a tincture of myrrh and castor. It may be given from five drops to twenty or thirty, or more, in pennyroyal water, or any other suitable vehicle.

445. *Elixir sacrum.*

Take rhubarb, cut small, ten drams; focotorine aloes, in powder, six drams; lesser cardamom seeds, half an ounce; French brandy, two pints. Digest for two days; and then strain the elixir.

446. *Camphorated spirit of wine.* L. E.

Take of camphor, two ounces; rectified spirit of wine, two pints. Mix them together, that the camphor may be dissolved.

This solution of camphor is employed chiefly for external uses, against rheumatic pains, paralytic numbnesses, inflammations; for discussing tumours, preventing gangrenes, or restraining their progress. It is too pungent to be exhibited internally, even when diluted:—

nor does the dilution succeed well; for on the admixture of aqueous liquors, the champhor gradually separates and runs together into little masses.

The most convenient method of uniting camphor with aqueous liquors, for internal use, seems to be by the mediation of almonds, or of mucilages; triturated with those, it readily mingles with water into the form of an emulsion, at the same time that its pungency is considerably abated. It may also be commodiously exhibited in the form of an oily draught, expressed oils totally dissolving it.

§ 7. OILS by INFUSION and DECOCTION.

447. EXPRESSED oils extract the resinous and oily parts of vegetables, but do not act upon or unite with the gummy and mucilaginous: hence the *oleum e mucilaginibus*, or oil of mucilages (n° 450) of the shops, contains nothing of the mucilage which its ingredients abound with. These oils may be tinged, by vegetable matters, of almost all colours: the leaves of most plants communicate a green; yellow flowers, a dilute gold colour; some red flowers, a light red; alkanet root, a beautiful and deep red.

448. In making the official oils from the leaves of plants, a good deal of care is necessary, to give them the fine green colour expected in them. If the boiling of the herb in the oil is not continued till all the aqueous moisture has exhaled (the mark of which is, the herb's being crisp), the oil will have a dingy yellowish hue: if continued longer, it turns black, and contracts an empyreumatic smell. The most convenient method of managing the process seems to be, to strain off the oil when sufficiently impregnated with the virtues of the plant, and afterwards to let it stand in a clean vessel over a gentle fire, until, by frequent trials on a white tile, it appears to have gained the deep green colour required.

449. Oil of St John's wort. L.

Take of the flowers of St John's wort, full blown, fresh gathered, and carefully freed from the cups, four ounces; oil olive, two pints. Pour the oil upon the flowers, and let them stand together till the oil is sufficiently coloured.

450. Oil of mucilages. L.

Take of marshmallow root, fresh, half a pound; linseed, fenugreek-seed, each three ounces; water, two pints; oil olive, four pints. Bruise the roots and seeds, and gently boil them in the water for half an hour; then add the oil, and continue the boiling till all the water is wasted; afterwards let the oil be carefully poured off for use.

451. Oil of elder. L.

Take of elder-flowers, one pound; oil-olive, two pints. Boil the flowers in the oil, till they are almost crisp; then press out the oil, and set it by till the feces have subsided.

452. Green oil. L.

Take of bay leaves, rue leaves, marjoram leaves, feawormwood leaves, chamomile leaves, each, fresh gathered, three ounces; oil olive, two pints. Bruise the herbs, and gently boil them in the oil till

they are almost crisp; then press out the oil, let it stand to settle, and afterwards pour it off from the sediment.

All the foregoing oils are designed for external applications only. They were supposed, besides the general emollient quality of the oil itself, to receive particular virtues from the ingredients. At present there are few who expect much more from these preparations than from common oil itself, which has the advantage of being less offensive. The mucilaginous ingredients, marshmallow root and linseed, in the *oleum e mucilaginibus*, make no addition to the virtue of the oil; for mucilages, as already observed, are not soluble in oils. Experience has not discovered any such singular qualities in flowers of St John's wort, that four ounces of them should communicate any remarkable virtue to a quart of oil. Of the other herbs, the more valuable parts are dissipated by the boiling heat: and although the remaining matter, if it was taken internally, either by itself, or dissolved in watery or spirituous liquors, might not be destitute of activity, yet it can scarcely be supposed, when combined with a large quantity of oil, to have any material effect in external applications. The number of these oils has, therefore, been judiciously retrenched at the late reformation: the four, above retained by the London college, are not one-tenth part of those which were formerly ordered to be kept in the shops. The most certain way of answering the purposes intended by these preparations appears to be, by mixing with the expressed oil a suitable quantity either of the native resins of vegetables, or of the essential oils and resinous extracts artificially prepared from them.

452. Camphorated oil. E.

Take of fresh-drawn oil of almonds, or linseed, two ounces; camphor, half an ounce. Dissolve the camphor in the oil.

This oil is designed, like the foregoing ones, for external purposes; particularly against burns, rheumatic pains, &c.

453. Odoriferous oil.

Let some fine carded cotton be dipped in oil of olive, or oil of ben nuts, that it may be thoroughly imbibed with the oil, without retaining so much as to drip spontaneously. Lay a bed of this cotton in the bottom of a tin or porcelain vessel, and lightly spread upon it a pretty thick layer of any odoriferous flowers fresh gathered, as jasmine flowers, violets, lilies of the valley, &c. Above these, spread more of the cotton, and then more flowers, alternately, till the vessel is full; then cover it close, and let it stand for twenty-four hours in a gentle warmth. Great part of the fragrance of the flowers will be communicated to the oil in the cotton, which is to be stratified in the same manner with two or three fresh quantities of the flowers, till it is sufficiently impregnated therewith; after which the oil is to be squeezed out from the cotton in a press.

This appears to be the most effectual method of transferring into expressed oils the odoriferous matter of those tender flowers which yield little or no essential oil: the perfumed oils and essences of those flowers brought

Prepara-
tions.

brought from Italy, are prepared in this manner. The odorous parts may be again separated from the oil, and transferred into water or spirit, by distillation with those liquors.

SECT. IV. *Conservation of recent Vegetables and their Infusions, &c. by Sugar and Honey.*

§ 1. CONSERVES.

454. CONSERVES are compositions of recent vegetable matters and sugar beaten together into an uniform mass.

This management was introduced for preserving certain simples, undried, in an agreeable form, with as little alteration as possible in their native virtues; and to some subjects it is very advantageously applied. Vegetables, whose virtues are lost or destroyed in drying, may in this form be kept uninjured for a length of time: for, by carefully securing the mouth of the containing vessel, the alteration, as well as dissipation, of their active principles, is generally prevented; and the sugar preserves them from the corruption which juicy vegetables would otherwise undergo.

There are, however, fundry vegetables whose virtues are impaired by this treatment. Mucilaginous substances, by long lying with sugar, become less glutinous, and astringents sensibly foster upon the palate. Many of the fragrant flowers are of so tender and delicate a texture, as almost entirely to lose their peculiar qualities on being beaten or bruised.

In general, it is obvious, that in this form, on account of the large admixture of sugar, only substances of considerable activity can be taken to advantage as medicines. And indeed, conserves are at present considered chiefly as auxiliaries to medicines of greater efficacy, or as intermediums for joining them together. They are very convenient for reducing into boluses or pills the more ponderous powders, as mercurius dulcis, the calces of iron, and other mineral preparations; which with liquid or less consistent matters, as syrups, will not cohere.

The shops were formerly encumbered with many conserves altogether insignificant; the few now retained have in general either an agreeable flavour to recommend them, or are capable of answering some useful purposes as medicines. Their common dose is the bulk of a nutmeg, or as much as can be taken up at once or twice upon the point of a knife. There is in general no great danger of exceeding in this particular.

455. *General method of preserving conserves.*

Leaves are picked from the stalks, and flowers from their cups. They are beaten in a marble mortar, with a wooden pestle, into a smooth mass; after which thrice their weight of double-refined sugar is added by degrees, and the beating continued till they are uniformly mixed.

The sugar should be pulverised by itself, and passed through a sieve, before it is mixed with the vegetable mass; otherwise it cannot easily be reduced to sufficient fineness, so as to be duly incorporated. Some vegetables are scarce reducible to the requisite fineness by beating in a mortar; such is orange-peel. This is most conveniently rasped or grated off from the fruit, then well mixed with the sugar, and the com-

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pound set by in a close vessel for some weeks; after which it may be beaten smooth with considerably less labour than at first. This peel, and red rose-buds, are commonly ground in a wooden mill made for that purpose.

456. *Conserve of the leaves of garden scurvy-grass. L.*

This is the only form that scurvy-grass in substance can be kept in without the total loss of its virtues. The conserve retains the full taste and virtue of the herb for a very considerable length of time, as a year or two, provided the vessel be made perfectly close and set in a cool place. It may be given in scorbutic habits three or four times a-day, or oftener.

457. *Conserve of the leaves of wood-forrel. L.*

This is a very elegant and grateful conserve; in taste it is lightly acidulous, with a peculiar flavour, which some resemble to that of green-tea. It is taken occasionally for quenching thirst, and cooling the mouth and fauces, in hot distempers. It may be usefully joined to the foregoing preparation, whose virtue it somewhat promotes, at the same time that it improves the taste.

458. *Conserve of the leaves of spearmint. L.*

The conserve of mint retains the taste and virtues of the herb. It is given in weakness of the stomach and retchings to vomit; and not unfrequently does service in some cases of this kind, where the warmer and more active preparations of mint would be less proper.

459. *Conserve of the leaves of rue. L.*

This conserve is given from a dram to half an ounce in crudities of the primæ viæ, for promoting digestion, and in hysterical disorders: it gently stimulates the solids, attenuates viscid juices, and excites the natural secretions. Some have had a great opinion of it, taken in a morning, as a preservative against the effects of contagious air or exhalation.

460. *Conserve of the tops of sea-wormwood. L.*

The conserve of wormwood has been celebrated in dropries: Matthioli relates, that several persons were cured by it of that distemper, without the assistance of any other medicine. Where the disorder indeed proceeds from a simple laxity or flaccidity of the solids, the continued use of this medicine may be of some service, as it appears to be a not inelegant mild corroborant. It is directed to be given in the dose of half an ounce, about three hours before meals.

461. *Conserve of the buds of red rose. L.*

This is a very agreeable and useful conserve. A dram or two, dissolved in warm milk, are frequently given as a light restringent in weakness of the stomach, and likewise in coughs and phthical complaints. In the German Ephemerides, examples are related of very dangerous phthises cured by the continued use of this medicine: in one of these cases, 20 pounds of the conserve were taken in the space of a month; and in another, upwards of 30. Riverius mentions several other instances of this kind.

462. *Conserve of rosemary-flowers. L.*

Rosemary-flowers in great measure lose their peculiar

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liar fragrance by beating; and hence the conserve has very little of their flavour. Some are therefore accustomed to make this preparation from the leaves of the plant, (which retain their virtues under the peltle), or at least to add a portion of these to the flowers. The conserve of rosemary is directed in weakness of the nerves, and as a light cordial.

463. *Conserve of the yellow rind of Seville orange-peel.* L.

This conserve is a very elegant one, containing all the virtues of the peel in a form sufficiently agreeable both with regard to the dose and the convenience of taking. It is a pleasant, warm stomachic, and in this intention is frequently made use of.

464. *Conserve of flos.* L.

Let the flos be put into water, and set over the fire till they grow soft, with care that they do not burst. Then take the flos out of the water, press out their pulp, and mix with it thrice its weight of double-refined sugar.

This preparation is a gentle astringent, and may be given as such in the dose of two or three drams. The degree of its astringency will vary according to the maturity of the flos and the length of time that the conserve has been kept.

§ 2. PRESERVES.

465. PRESERVES are made by steeping or boiling recent simples, first in water, and then in syrup or solution of sugar. The subject is afterwards either kept moist in the syrup; or taken out and dried, that the sugar may candy upon it: this last is the most usual method.

In this process some of the most valuable parts of the subject are extracted by the liquor, and consequently lost to the preparation; greater regard being here had to palatableness than medicinal efficacy. And indeed most of the preparations of this kind are considered rather as sweetmeats than as medicines, as the business of the confectioner rather than of the apothecary. It would be needless therefore to mention the doses of the several articles, or give particular remarks on the manner of preparing them.

466. *Candied eryngo roots.* L.

Boil them in water till the rind will easily peel off; when peeled, slit them through the middle, take out the pith, and wash them three or four times in cold water. For every pound of the roots so prepared, take two pounds of double-refined sugar, which is to be dissolved in a proper quantity of water, and set over the fire: as soon as the liquor begins to boil, put in the roots, and continue the boiling till they are soft.

467. After this manner are candied, *Angelica stalks*, &c.

468. *Candied orange-peel.* L.

Steep the fresh peels of Seville oranges in water; which is to be frequently renewed, until they lose their bitterness. Then, having dissolved in water a suitable quantity of double-refined sugar, boil the peels in this liquor till they become soft and transparent.

469. After the same manner are candied, *Lemon-peels*.

470. *Nutmegs and ginger* are brought to us ready candied from the East Indies. E.

471. *Candied steel.*

Put any quantity of clean filings of iron into a brass kettle, suspended over a very gentle fire. Add to them, by little and little, twice their weight of white sugar, boiled to the consistence of candy, with which powdered starch has been previously mixed in the proportion of a dram to every pound; agitating the kettle continually, that the filings may be cruised over with the sugar, and taking great care to prevent their running into lumps.

This is a very agreeable preparation of steel; but has hitherto been made only by the confectioners. The college of Edinburgh received it in the former editions; but, as there described, it was almost impossible to hinder the matter from concreting into lumps. They have now discovered the intermedium which prevents that inconvenience, and which the confectioners have kept a secret, the addition of a little starch to the sugar. The preparation may be given to the quantity of half a dram, in those cases wherein chalybeate medicines are proper.

§ 3. GELLIES.

472—477. VEGETABLE gellies are composed of the juices of fruits and sugar, boiled to a thick consistence. Independently of the admixture of sugar, the boiling appears to occasion some alteration in the quality of the juices themselves. The recent juices of the summer fruits are prone to fermentation: after they have been boiled, they are less disposed to ferment, and at the same time they are much less liable to produce, in the human body, flatulencies, gripes, or fluxes; tho' they still retain, in no small degree, their original antiseptic, anti-inflammatory, and aperient or restraining virtues.

§ 4. SYRUPS.

478. SYRUPS are saturated solutions of sugar made in water, or watery or vinous infusions, or in juices. They were formerly considered as medicines of much greater importance than they are thought to be at present. Syrups and distilled waters were for some ages made use of as the great alteratives; inasmuch that the evacuation of any peccant humour was never attempted till, by a due course of these, it had first been regularly prepared for expulsion. Hence arose the exuberant collection of both which we meet with in pharmacopœias; and like errors have prevailed in each. As multitudes of distilled waters have been compounded from materials unfit to give any virtue over the helm, so numbers of syrups have been prepared from ingredients which in this form cannot be taken in sufficient doses to exert their virtue; for two thirds of a syrup consist of sugar, and greatest part of the remaining third is an aqueous fluid.

479. Syrups are at present chiefly regarded as convenient vehicles for medicines of greater efficacy; and made use of for sweetening draughts and juleps, for reducing the lighter powders into boluses, pills, or electuaries, and other like purposes. Some likewise may not improperly be considered as medicines themselves; as those of saffron and buckthorn-berries.

480. *General*

480. *General rules for preparing syrups.*

I. All the rules laid down for making decoctions are likewise to be observed in the decoctions for syrups. Vegetables, both for decoctions and infusions, ought to be dry, unless they are expressly ordered otherwise.

II. Only the purest or double-refined sugar ought to be used.

In the syrups prepared by boiling, it has been customary to perform the clarification with whites of eggs after the sugar had been dissolved in the decoction of the vegetable. This method is apparently injurious to the preparation; since not the impurities only of the sugar are thus discharged, but a considerable part likewise of the medicinal matter, which the water had before taken up from the ingredients, is separated along with them. Nor indeed is the clarification and depuration of the sugar, by itself, very advisable; for its purification by this process is not so perfect as might be expected: after it has undergone this process, the refiners still separate from it a quantity of oily matter, which is disagreeable to weak stomachs. It appears therefore most eligible to employ fine sugar for all the syrups; even the purgative ones (which have been usually made with coarse sugar, as somewhat coinciding with their intention) not excepted; for as the purgative medicines are in general ungrateful to the stomach, it is certainly improper to employ an addition which increases their offensiveness.

III. Where the weight of the sugar is not expressed, 29 ounces thereof are to be taken to every pint of liquor. The sugar is to be reduced into powder, and dissolved in the liquor by the heat of a water-bath, unless ordered otherwise. *L.*

Although in the formulæ of several of the syrups, a double weight of sugar to that of the liquor is directed, yet less will generally be sufficient. First, therefore, dissolve in the liquor an equal weight of sugar; then gradually add some more in powder till a little remains undissolved at the bottom, which is to be afterwards incorporated by setting the syrup in a water-bath.

The quantity of sugar should be so much as the liquor is capable of keeping dissolved in the cold: if there is more, a part of it will separate and concrete into crystals or candy; if less, the syrup will be subject to ferment, especially in warm weather, and change into a vinous or sour liquor. If, in crystallizing, only the superfluous sugar separated, it would be of no inconvenience; but when part of the sugar has candied, the remaining syrup is found to have an under proportion, and is as subject to fermentation as if it had wanted sugar at first.

IV. Copper-vessels, unless they are well tinned, should not be employed in the making of acid syrups, or such as are composed of the juices of fruits.

The confectioners, who are the most dextrous people at these kinds of preparations, to avoid the expence of frequently new-tinning their vessels, rarely make use of any other than copper ones untinned, in the preparation even of the most acid syrups, as of oranges and lemons. Nevertheless, by taking due care that their coppers be well scoured and perfectly clean, and that the syrup remain no longer in them than is abso-

lutely necessary, they avoid giving it any ill taste or quality from the metal. This practice, however, is by no means to be recommended to the apothecary.

V. The syrup, when made, is to be set by till next day: if any saccharine crust appears upon the surface, take it off. *L.*

481. *Syrup of garlic.* *L.*

Take of garlic, sliced, one pound; boiling water, two pints. Macerate them in a close vessel for twelve hours; then strain off the liquor, and dissolve in it a proper quantity of sugar, so as to make a syrup.

This syrup is occasionally made use of for attenuating viscid phlegm, and promoting expectoration in humoral asthmas and oppressions of the breast: in these cases, it proves a medicine of considerable efficacy, though a very unpleasant one; it tastes and smells strongly of the garlic. The college have received it as an alternative to the oxymel of garlic, for the use of those with whom honey disagrees.

482. *Syrup of marshmallows.*

Take of marshmallow roots, fresh, one pound; double-refined sugar, four pounds; water, one gallon. Boil the water with the roots to one half: when grown thoroughly cold, pour off and press out the decoction, and set it by for a night to settle: next morning pour off the clear liquor, and, adding to it the sugar, boil the whole to the weight of fix pounds. *L.*

Take of moderately dried marshmallow-roots, nine ounces; white sugar, four pounds; water, a gallon. Boil the water with the marshmallow-roots to the consumption of one half; then strain out the remaining decoction, and suffer it to rest for some time. Pour off the clear liquor from the sediment, and boil it with the sugar over a gentle fire, keeping the matter continually stirring till it becomes a syrup. *E.*

The syrup of marshmallows is used chiefly in nephritic cases, for sweetening emollient decoctions, and the like: of itself it can do little service, notwithstanding the high opinion which some have entertained of it; for what can be expected from two or three spoonfuls of the syrups, when the decoction, from which two or three pounds are made, may be taken at a draught or two? The college of Edinburgh has very properly united this and the *pectoral syrup* into one; for the syrup of marshmallows has always, till the late reformation, contained the principal ingredients of the pectoral syrup, and its own capital ingredient coincides in the same intention.

483. *Syrup of orange-peel.*

Take of the yellow rind of Seville orange-peel, fresh, eight ounces; boiling water, five pints. Macerate them for a night in a close vessel; next morning strain out the liquor, and dissolve in it the proper quantity of sugar for making it into a syrup. *L.*

Take of the yellow rind of orange-peel, fresh, six ounces; boiling water, three pints. Infuse them for a night in a close vessel; then strain the liquor; let it stand to settle; and, having poured it off clear from the sediment, dissolve therein seven pounds and

a quarter of white sugar, so as to make it into a syrup without boiling. *L.*

In making this syrup, it is particularly necessary that the sugar be previously powdered, and dissolved in the infusion with as gentle a heat as possible, to prevent the exhalation of the volatile parts of the peel. With these cautions, the syrup proves a very elegant and agreeable one, possessing great share of the fine flavour of the orange-peel.

484. a. *Balsamic-syrup.*

Take of balsam of Tolu, eight ounces; water, three pints. Boil them for two or three hours in a circulatory vessel, or at least in a long-necked matras, having its mouth lightly covered. When grown cold, strain out the liquor, and mix therewith a proper quantity of sugar to make it into a syrup. *L.* The coction may be conveniently performed in a retort, with a receiver adapted to it, the liquor which comes over being occasionally poured back; or the water may be entirely drawn off, and the sugar dissolved in the distilled liquor.

Take of the syrup of sugar, just made, and warm from the fire, two pounds; tincture of balsam of Tolu, one ounce. When the syrup has grown almost cold, stir into it the tincture by little at a time, agitating them well together till perfectly united. The mixture is then to be kept in the heat of a water-bath until the spirit has exhaled. *L.*

The intention of the contrivers of the two foregoing processes seems to have been somewhat different. In the first, the more subtle and fragrant parts of the balsam are extracted from the grosser resinous matter, and alone retained in the syrup: the other syrup contains the whole substance of the balsam in larger quantity. They are both moderately impregnated with the agreeable flavour of the balsam.

In some pharmacopœias, an elegant syrup of this kind is prepared from a tincture of balsam of Peru, with rose-water and a proper quantity of sugar.

484. b. *Syrup of clove-julyflowers.*

Take of clove-julyflowers, fresh gathered, and freed from the heels, three pounds; boiling water, five pints. Macerate them for a night in a glass or glazed earthen vessel; then strain off the liquor, and dissolve therein its due proportion of sugar to make it into a syrup. *L.*

One pound of the flowers is to be infused in three pints of water, and the syrup made as above without boiling. *E.*

This syrup is of an agreeable flavour, and a fine red colour; and for these it is chiefly valued. Some have substituted to it one easily parable at seasons when the flowers are not to be procured: An ounce of clove spice is infused for some days in 12 ounces of white-wine, the liquor strained, and, with the addition of 20 ounces of sugar, boiled to a proper consistence: a little cochineal renders the colour of this syrup exactly similar to that prepared from the clove-julyflower; and its flavour is of the same kind, though not so pleasant. The abuse may be readily detected, by adding to a little of the syrup some alkaline salt or

ley, which will change the genuine syrup to a green colour; but in the counterfeit, it will make no such alteration, only varying the shade of the red.

484. c. *Syrup of colchicum.* *E.*

Take of the root of colchicum, cut into thin slices, one ounce; vinegar, one pint; fine sugar, 26 ounces. Digest the root for two days in the vinegar, shaking the vessel now and then; then strain, pressing out the liquor slightly. Add the sugar to the strained liquor, and boil it gently to the consistence of a syrup.

485. *Syrup of saffron.* *L.*

Take of saffron wine, one pint; double-refined sugar, 15 ounces. Dissolve the sugar in the wine, so as to make a syrup thereof.

Saffron is very well fitted for making a syrup, as in this form a sufficient dose of it is contained in a reasonable compass. This syrup is at present more frequently prescribed than the wine from which it is made: it is a pleasant cordial, and gives a fine colour to juleps.

486. *Syrup of quinces.* *L.*

Take of quince-juice, depurated, three pints; cinnamon, one dram; cloves, ginger, each half a dram; red port wine, one pint; double-refined sugar, nine pounds. Digest the juice with the spices, in the heat of ashes, for six hours; then adding the wine, pass the liquor through a strainer; and afterwards dissolve in it the sugar, so as to make a syrup.

If the quinces are kept for some time in an airy place before the juice is pressed out, the syrup proves rather more elegant, and richer of the fruit than when they are taken fresh from the tree. In either case, the preparation is a very agreeable, mild, cordial refringent; and in some kinds of loosenesses and disorders of the stomach, may be either taken by itself in the quantity of a spoonful or two at a time, or employed for reconciling to the palate and stomach medicines of the more ungrateful kind.

487. *Syrup of kermes.*

This syrup, which is brought to us ready made, from the southern parts of France, is of an agreeable taste, and a fine red colour. It is accounted cordial and corroborant, and supposed to be particularly serviceable in weaknesses and other disorders of pregnant women.

488. *Syrup of lemon-juice.* *L. E.*

Take of juice of lemons, suffered to stand till the faeces have subsided, and afterwards strained, two pints; double-refined sugar, 50 ounces. Dissolve the sugar in the juice, so as to make a syrup thereof. *L.*

After the same manner are prepared,

489. *Syrup of mulberries.* *L.*

490. *Syrup of raspberries.* *L.*

All these are very pleasant, cooling syrups; and in this intention are occasionally made use of in draughts and juleps, for quenching thirst, abating heat, &c. in bilious or inflammatory distempers. They are sometimes likewise employed in gargarisms for inflammations of the mouth and tonsils.

491, a. *Syrup of meconium, or diacodium. L.*

Take of white poppy heads, dried and cleared from the seeds, three pounds and a half; water, six gallons. Cut the heads, and boil them in the water, stirring them now and then, to prevent their burning, till only about one third part of the liquor remains, which will be almost entirely soaked up by the poppies. Then remove the vessel from the fire, strongly press out the decoction, and boil it down to about four pints: strain it whilst hot, first through a sieve, and afterwards through a fine woollen cloth; and set it by for a night, that the faeces may subside. Next morning pour the liquor off clear, and boil it with six pounds of double-refined sugar, until the weight of the whole is nine pounds, or a little more, that it may become a syrup of a proper consistence.

This syrup, impregnated with the opiate matter of the poppy-heads, is given to children in doses of two or three drams, to adults from half an ounce to an ounce and upwards, for obtunding and incrassating acrimonious humours, easing pain, procuring rest, and answering the other intentions of mild opiates. Particular care is requisite in its preparation, that it may be always made, as nearly as possible, of the same strength; and accordingly the college has been very minute in their description of the process.

491, b. *Syrup of white poppies, or of meconium, commonly called diacodium. E.*

Take of white poppy heads, just ripe, and moderately dried, two pounds; boiling-water, three gallons. Let these be steeped together for a night, and then boiled until half the liquor is wasted: strain, and strongly press out the remainder; and boil it, with the addition of four pounds of white sugar, to the consistence of a syrup.

This process is considerably different from the preceding. The poppy-heads are not boiled so long; and their quantity, in proportion to the produce of syrup, is much less. How far these differences may affect the strength of the preparations, we shall not take upon us to determine.

492. *Syrup of wild poppies. L.*

Take of wild poppy flowers, fresh, four pounds; boiling-water, four pints and a half. Pour the water on the poppies, set them over the fire, and frequently stir them, until the flowers are thoroughly moistened: as soon as they have sunk under the water, let the whole be set by to steep for a night; next day pour off, and press out the liquor, and set it by for a night longer to settle; afterwards add the proper quantity of double-refined sugar to make it into a syrup.

The design of setting the flowers over the fire, is, (as Dr Pemberton observes), that they may be a little scalded, so as to shrink enough to be all immersed in the water; without this artifice, they can scarce be all got in: but they are no longer to be continued over the fire than till this effect is produced, lest the liquor become too thick, and the syrup be renderedropy.

This syrup has been recommended in disorders of the breast, coughs, spitting of blood, pleuritis, and other diseases, both as an emollient and as an opiate.

It is one of the lightest of the opiate medicines, and in this respect so weak, that some have doubted of its having any anodyne quality.

493. *Pectoral syrup. L. [See 482.]*

Take of English maidenhair, dried, five ounces; liquorice, four ounces; boiling-water, five pints. Macerate them for some hours: then strain out the liquor, and with a proper quantity of double-refined sugar make it into a syrup.

The title of this composition expresses its medicinal intention: it is supposed to soften acrimonious humours, allay tickling coughs, and promote the expectoration of tough phlegm.

494, a. *Solutive Syrup of roses. L.*

Take the liquor that remains after the distillation of six pounds of damask roses; double-refined sugar, five pounds. Having pressed out the liquor from the roses, boil it down to three pints, and set it by for a night to settle: next morning pour it off clear from the sediment; and adding the sugar, boil the mixture to the weight of seven pounds and a half.

494, b. *Syrup of pale roses: E.*

Take of pale roses, fresh gathered, one pound; boiling-water, three pints; white sugar, three pounds. Macerate the roses in the water for a night: then strain the liquor; and adding to it the sugar, boil them into a syrup. This syrup may likewise be made from the liquor remaining after the distillation of rose-water, depurated from its faeces.

The liquor remaining after the distillation of roses (provided the still has been perfectly clean) is as proper for making this syrup as a fresh infusion; for the distillation only collects those volatile parts which are dissipated in the air, whilst the infusion is boiling to its consistence. This syrup is an agreeable and mild purgative for children, in the dose of half a spoonful, or a spoonful. It likewise proves gently laxative to adults, and in this intention may be of service in costive habits. Its principal use is in solutive glysters,

494, c. *Syrup of dry roses. E.*

Take of red roses, dried, seven ounces; white sugar, six pounds; boiling-water, four pints. Infuse the roses in the water for a night; then boil them a little, strain out the liquor, and, adding to it the sugar, boil them to the consistence of a syrup.

This syrup is supposed to be mildly astringent; but is principally valued on account of its red colour.

495. *Syrup of squills.*

Take of vinegar of squills, a pint and a half; cinnamon, ginger, each one ounce; double-refined sugar, three pounds and a half. Steep the spices in the vinegar for three days; then strain out the liquor, and add the sugar so as to make a syrup thereof. E.

Take of vinegar of squills, a pound and an half; white sugar, three pounds and an half. Make them into a syrup, without boiling. E.

The spices, in the first of these compositions, somewhat alleviate the offensiveness of the squills, though not so much as to prevent the medicine from being
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disagreeable. It is used chiefly, in doses of a spoonful or two, for attenuating viscid phlegm, and promoting expectoration, which it does very powerfully.

496. *The simple syrup, or syrup of sugar.* E.

Take of white sugar, water, each equal quantities. Boil them into a syrup.

This preparation is a plain liquid sweet, void of flavour or colour. It is convenient for sundry purposes where these qualities are not wanted, or would be exceptionable.

497. a. *Syrup of buckthorn.*

Take of the juice of ripe and fresh buckthorn-berries, one gallon; cinnamon, ginger, nutmegs, each one ounce; double-refined sugar, seven pounds. Set the juice by for some days to settle; then pass it thro' a strainer, and in some part thereof macerate the spices. Boil the rest of the juice, adding towards the end that part in which the spices were macerated, first passed through a strainer: this part of the process must be so managed, that the whole liquor may be reduced to four pints. Lastly, put in the sugar, and make the mixture into a syrup. L.

Take of the juice of ripe buckthorn-berries, depurated, six pounds; white sugar, three pounds and an half. Boil them to the consistence of a syrup. E.

This syrup, in doses of three or four spoonfuls, operates as a brisk cathartic. The principal inconveniences attending it are, its being very unpleasant, and occasioning a thirst and dryness of the mouth and fauces, and sometimes violent gripes; both these may be prevented by drinking liberally of water-gruel, or other warm liquors, during the operation. The ungratefulness of the buckthorn is endeavoured to be remedied by the addition of aromatics, which, however, are scarcely sufficient for that purpose.

497. b. *Syrup of violets.*

Take of violets, fresh, and well coloured, two pounds; boiling-water, five pints. Macerate them for a whole day in a glass, or at least a glazed earthen vessel; then pour out the liquor, and pass it through a thin linen-cloth, carefully avoiding even the lightest pressure: afterwards, adding the due proportion of sugar, make it into a syrup. L.

Take of March violets, fresh, one pound; boiling water, three pints. Steep them together for a night, in a glazed earthen vessel close covered: then strain out the liquor, and dissolve in it seven pounds and a quarter of white sugar, so as to make a syrup without boiling. E.

This syrup is of a very agreeable flavour; and, in the quantity of a spoonful or two, proves to children gently laxative. It is apt to lose, in keeping, the elegant blue colour, for which it is chiefly valued; and hence some have been induced to counterfeit it with materials whose colour is more permanent. This abuse may be readily discovered, by adding to a little of the suspected syrup any acid or alkaline liquor. If the syrup is genuine, the acid will change its blue colour to a red, and the alkali will change it to a green; but if counterfeit, these changes will not happen.

498. *Syrup of ginger.*

Take of ginger, cut into thin slices, four ounces; boil-

ing water, three pints. Macerate them for some hours; then strain out the liquor, and make it into a syrup with a proper quantity of double-refined sugar. L.

Take of ginger, sliced and bruised, three ounces; white sugar, seven pounds and a quarter; boiling-water, three pints. Steep the ginger in the water, in a close vessel, for a night; then boil them a little, and having strained out the decoction set it by to settle. Pour off the clear liquor, add to it the sugar, and make them into a syrup. E.

This is an agreeable and moderately aromatic syrup, lightly impregnated with the flavour and virtues of the ginger.

499. *Confection of kermes.* L.

Take of juice of kermes-grains, warmed and strained, three pounds; damask rose-water, six ounces by measure; oil of cinnamon, half a scruple; double-refined sugar, one pound. Dissolve the sugar in the rose-water, by the heat of a water-bath, into a syrup; then mix in the juice of kermes, and, after it has grown cold, the oil of cinnamon. L.

This is a very elegant and agreeable cordial; the dose, when taken by itself, is from a scruple to a dram or more. Particular care ought to be had in the choice of the essential oil, which for the most part is grievously adulterated: it would be convenient to grind the oil with a little of the sugar, before it is added to the other ingredients; for by this means, it will mix more perfectly, and not be apt to separate in keeping.

500. *Rob of elder-berries.* E.

Take of the juice of ripe elder-berries, four pounds; fine sugar, half a pound. Boil them on a gentle fire to the consistence of thick honey.

§ 5. HONEYS AND OXYMELS.

THE more fixed parts of vegetables, dissolved in watery liquors, may be thence transferred into honey, by mixing the honey with the watery decoction or juice of the plant, and boiling them together till the aqueous part has exhaled, and the honey remains of its original consistence.

501. *Honey of roses.*

Take of rose-buds, freed from the heels, and hastily dried, four ounces; boiling water, three pints; clarified honey, five pounds. Steep the roses in the water for some hours: then strain off the liquor, mix with it the honey, and boil the mixture to the consistence of honey.

This preparation is not unfrequently made use of, as a mild cooling detergent, particularly in gargarisms for ulcerations and inflammation of the mouth and tonsils. The design of hastily drying the roses, is that they may the better preserve their astringency.

502. *Solutive honey.* L.

Take the liquor remaining after the distillation of fix pounds of damask-roses; cummin seeds, bruised a little, one ounce; brown sugar, four pounds; honey, two pounds. Having pressed out the liquor, boil it to three pints; adding towards the end, the seeds tied up in a linen cloth. Then put in the sugar and

honey, and boil down the mixture to the consistence of thin honey.

This composition is very well contrived for the purpose expressed in its title. It is principally employed in laxative glysters; and hence brown sugar is here allowed; whilst, for all other uses, the double-refined is directed.

503. *Oxymel of garlic.* L.

Take of garlic, cut in slices, an ounce and a half; caraway seeds, sweet fennel seeds, each two drams; clarified honey, ten ounces by weight; vinegar, half a pint. Boil the vinegar, for a little time, with the seeds bruised, in a glazed earthen vessel; then add the garlic, and cover the vessel close; when grown cold, press out the liquor, and dissolve in it the honey by the heat of a water-bath.

This oxymel is recommended for attenuating viscid juices, promoting expectoration, and the fluid secretions in general. It is doubtless a medicine of considerable efficacy, though very unpleasant, the flavour of the garlic prevailing, notwithstanding the addition of the aromatic seeds.

504. *Pectoral oxymel.*

Take of elecampane roots, one ounce; Florence orris roots, half an ounce; gum ammoniacum, one ounce; vinegar, half a pint; clarified honey, one pound; water, three pints. Let the roots, cut and bruised, be boiled in the water till one-third is wasted: then strain off the liquor; let it stand to settle; and having poured it off clear from the feces, add to it the honey, and the ammoniacum, previously dissolved in the vinegar. Mix them together, by boiling them a little.

This composition is designed for those disorders of the breast that proceed from a load of viscid phlegm (which this medicine attenuates and promotes the expectoration of) and obstructions of the pulmonary vessels. Two or three spoonfuls may be taken every night and morning, and continued for some time.

505. *Oxymel of squills.* L.

Take of clarified honey, three pounds; vinegar of squills, two pints. Boil them in a glazed earthen vessel, over a gentle fire, to the consistence of a syrup.

This is an useful aperient, detergent, and expectorant, and of great service in humoral asthma, coughs, and other disorders, where thick phlegm abounds. It is given in doses of two or three drams, along with some aromatic water, as that of cinnamon, to prevent the great nausea which it would otherwise be apt to excite. In large doses, it proves emetic.

506. *Simple oxymel.* L.

Take of clarified honey, two pounds; vinegar, one pint. Boil them to a due consistence.

This simple preparation is not inferior in efficacy to many more elaborate compositions. It is an agreeable, mild, cooling, saponaceous, detergent, and attenuating medicine. It is often used in cooling detergent gargarisms, and not unfrequently as an expecto-

507. The boiling of oxymels in glazed earthen vessels, is not free from danger. Their glazing is procured by a vitrification of lead; and vinegar, by a boiling heat, may corrode so much so much of vitrified lead, as to receive from it noxious qualities.

SECT. V. *Separation and collection of those parts of Vegetable and Animal substances which are volatile in the heat of boiling water.*

508. THERE are many vegetable, and some animal substances, whose virtues reside, wholly or in part, in a matter which is capable of totally exhaling in the heat of boiling water. In most of the processes hitherto described it is endeavoured, if possible, to preserve this volatile matter along with the more fixed parts; whether those fixed parts were themselves medicinal, or only subservient to the union of the volatile matter with the fluids employed. The aim, in the present section, is, to completely separate this volatile subtle principle, and collect it pure from the grosser fixed parts, either in a concentrated state, or diluted with water or spirit of wine. In its concentrated state, it appears commonly an oil; which, from its containing always the specific odour, and frequently the other medicinal powers of the subject, is called *essential oil*.

§ 1. ESSENTIAL OILS.

509. THESE are drawn by distillation in an alembic, with a large refrigeratory. A quantity of water is added to the subject, sufficient to prevent its burning; and in this water it is likewise macerated a little time before the distillation. The oil comes over along with the water; and either swims on its surface, or sinks to the bottom, according as it is lighter or heavier than that fluid. L.

510. Essential oils are obtained only from odiferous substances; but not equally from all of this class, nor in quantity proportionable to their degree of odour; some, which if we were to reason from analogy should seem very well fitted for this process, yielding extremely little oil, and others none at all. Roses and camomile flowers, whose strong and lasting smell promises abundance, are found upon experiment to contain but a small quantity: the violet and jasmine flowers, which perfume the air with their odour, lose their smell upon the gentlest coction, and do not afford the least perceptible mark of oil upon being distilled, unless immense quantities are submitted to the operation at once: while favin, whose disagreeable scent extends to no great distance, gives out the most oil of almost any vegetable known.

Nor are the same plants equally fit for this operation, when produced in different soils or seasons, or at different times of their growth. Some yield more oil if gathered when the flowers begin to fall off than at any other time; lavender and rue, for instance. Others, as sage, afford the largest quantity when young, before they have sent forth any flowers: and others, as thyme, when the flowers have just appeared. All fragrant herbs yield a larger proportion of oil when produced in dry soils and warm summers, than in the opposite circumstances. On the other hand, some of the disagreeable strong-scented ones, as worm-

wood,

wood, are said to contain most in rainy seasons and moist rich grounds.*

511. With regard to the proportion of water, if whole plants, moderately dried, are used, or the shavings of woods; as much of either may be put into the vessel, as, lightly pressed, will occupy half its cavity; and as much water may be added, as will arise up to two thirds its height. The water and ingredients, all together, should never take up more than three-fourths of the still; there should be liquor enough to prevent any danger of an empyreuma, but not so much as to be too apt to boil over into the receiver.

The maceration should be continued so long, as that the water may fully penetrate the pores of the subject. To promote this effect, woods should be thinly shaved across the grain, roots cut transversely into thin slices, barks reduced into coarse powder, and seeds lightly bruised. Very compact and tenacious substances require the maceration to be continued a week or two, or longer; for those of a softer and looser texture, two or three days are sufficient; whilst some tender herbs and flowers not only stand not in need of any at all, but are even injured by it.

512. The choice of proper instruments is of great consequence to the performance of this process to advantage. There are some oils, which pass freely over the swan-neck of the head of the common still: others, less volatile, cannot easily be made to rise so high. For obtaining these last Dr Lellow recommends a large low head, having a rim or hollow canal round it; in this canal the oil is detained on its first ascent (and thence conveyed at once into the receiver), the advantages of which are sufficiently obvious.

With regard to the fire, the operator ought to be expeditious in raising it at first, and to keep it up, during the whole process, of such a degree, that the oil may freely distil; otherwise, the oil will be exposed to an unnecessary heat, a circumstance which ought as much as possible to be avoided. Fire communicates to all these oils a disagreeable impression, as is evident from their being much less grateful when newly distilled, than after they have stood for some time in a cool place; the longer the heat is continued, the more alteration it must produce in them.

The greater number of oils require for their distillation the heat of water strongly boiling: but there are many also which rise with a considerably less heat; such as those of lemon-peel, citron-peel, of the flowers of lavender and rosemary, and of almost all the more odoriferous kinds of flowers. We have already observed, that these flowers have their fragrance greatly injured, or even destroyed, by beating or bruising them: it is impaired also by the immersion in water in the present process, and the more so in proportion to the continuance of the immersion and the heat: hence these oils, distilled in the common manner, prove much less agreeable in smell than the subjects themselves. For the distillation of substances of this class, another method has been contrived: instead of being immersed in water they are exposed only to its vapour. A proper quantity of water being put into the bottom of the still, the odoriferous herbs or flowers are laid lightly in a basket, of such a size, that it may enter into the still, and rest against its sides, just above

the water. The head being then fitted on, and the water made to boil, the steam, percolating through the subject, imbibes the oil, without impairing its fragrance, and carries it over into the receiver. Oils thus obtained possess the odour of the subject in an exquisite degree, and have nothing of the disagreeable scent perceivable in those distilled by boiling them in water in the common manner.

The water employed in the distillation of essential oils, always imbibes some portion of the oil; as is evident from the smell, taste, and colour, which it acquires. It cannot, however, retain above a certain quantity; and therefore, such as has been already used and almost saturated itself, may be advantageously employed, instead of common water, in a second, third, or any future distillation of the same subject.

After the distillation of one oil, particular care should be had to duly cleanse the worm before it is employed in the distillation of a different plant. Some oils, those of wormwood and aniseeds for instance, adhere to it so tenaciously, as not to be melted out by heat, or washed off by water: the best way of cleansing the worm from these, is to run a little spirit of wine through it.

513. Essential oils, after they are distilled, should be suffered to stand for some days in vessels loosely covered with paper, till they have lost their disagreeable fiery odour and become limpid: then put them up in small bottles, which are to be kept quite full, closely stoped, in a cool place: with these cautions, they will retain their virtues in perfection for many years.

When carelessly kept, they in time gradually lose of their flavour, and become gross and thick. Some endeavour to recover them again after they have undergone this change, by grinding them with about thrice their weight of common salt, then adding a large proportion of water, and distilling them afresh: the purer part arises thin and limpid, possessing a great degree of the pristine smell and taste of the oils, though inferior in both respects to what the oil was at first. The oils, when thus altered, are nearly in the same state with the turpentine, and other thickened oily juices, which readily yield their purer oil in distillation with water alone.

514. Essential oils, medically considered, agree in the general qualities of pungency and heat; in particular virtues, they differ as much as the subjects from which they are obtained, the oil being the direct principle in which the virtues, or part of the virtues, of the several subjects reside. Thus the carminative virtue of the warm feeds, the diuretic of juniper-berries, the emmenagogue of safin, the nervine of rosemary, the stomachic of mint, the antiscorbutic of scurvy-grass, the cordial of aromatics, &c. are concentrated in their oils.

There is another remarkable difference in essential oils, the foundation of which is less obvious; that of the degree of their pungency and heat; which are by no means in proportion, as might be expected, to those of the subjects they were drawn from. The oil of cinnamon, for instance, is excessively pungent and fiery; in its undiluted state, it is almost caustic: whereas cloves, a spice which in substance is far more pungent than the other, yields an oil which is far less so.

This.

This difference seems to depend partly upon the quantity of oil afforded, cinnamon yielding much less than cloves, and consequently having its active matter concentrated into a smaller volume; partly, upon a difference in the nature of the active parts themselves: for though essential oils contain always the specific odour and flavour of their subjects, whether grateful or ungrateful, they do not always contain the whole pungency; this resides frequently in a more fixed resinous matter, and does not rise with the oil. After the distillation of cloves, pepper, and some other spices, a part of their pungency is found to remain behind: a simple tincture of them in rectified spirit of wine is even more pungent than their pure essential oils.

415. The more grateful oils are frequently made use of for reconciling to the stomach medicines of themselves disgusting. It has been customary to employ them as correctors for the resinous purgatives; an use which they do not seem to be well adapted to. All the service they can here be of, is to make the resin fit easier at first on the stomach; far from abating the irritating quality upon which the virulence of its operation depends, these pungent oils superadd a fresh stimulus.

Essential oils are never given alone, on account of their extreme heat and pungency; which in some is so great, that a single drop let fall upon the tongue, produces a gangrenous eschar. They are readily imbibed by pure dry sugar, and in this form may be conveniently exhibited. Ground with eight or ten times their weight of the sugar, they become soluble in aqueous liquors, and thus may be diluted to any assigned degree. Mucilages also render them miscible with water into an uniform milky liquor. They dissolve likewise in spirit of wine; the more fragrant in an equal weight, and almost all of them in less than four times their own quantity: these solutions may be either taken on sugar, or mixed with syrups or the like; on mixing them with water, the liquor grows milky, and the oil separates.

The more pungent oils are employed externally against paralytic complaints, numbness, pains, and aches, cold tumours, and in other cases where particular parts require to be heated or stimulated. The toothach is sometimes relieved by a drop of these almost caustic oils, received on cotton, and cautiously introduced into the hollow tooth.

516. *Essential oil of the leaves of wormwood.* L.

This is one of the more ungrateful oils: it smells strongly of the wormwood; and contains its particular nauseous taste, but has little or nothing of its bitterness, this remaining entire in the decoction left after the distillation: its colour, when drawn from the fresh herb, is a dark green; from the dry, a brownish yellow. This oil is employed chiefly as a vermifuge; and for this purpose is both applied externally to the belly, and taken internally: it is most conveniently exhibited in the form of pills, which it may be reduced into by mixing it with crumb of bread.

517. *Essential oil of dill-seeds.* L. E.

This is a very warm oil; of a flavour not very agreeable, less so than that of the seeds. It is sometimes given as a carminative, in flatulencies, colicky pains, hiccup, and the like, from one to three or four drops.

518. *Essential oil of aniseeds.* L. E.

This oil possesses the taste and smell of the aniseeds in perfection. It is one of the mildest of the distilled oils: 15 or 20 drops may be taken at a time without danger, though common practice rarely goes so far as half this number. Its smell is extremely durable and dissoluble: milk drawn from the breast after taking it, is found impregnated with its odour; and possibly this may be, in part, the foundation of the pectoral virtues usually ascribed to it: in flatulencies and colics, it is said by some to be less effectual than the seeds themselves.

It is remarkable of this oil, that it congeals, even when the air is not sensibly cold, into a butyrous confluence: and hence, in the distillation of it, the operator ought not to be over-folitious in keeping the water in the refrigeratory too cool: it behoves him rather to let it grow somewhat hot, particularly towards the end of the process; otherwise the oil, congealing, may so stop up the worm, as to endanger blowing off the head of the still, at least a considerable quantity of oil will remain in it.

519. *Essential oil of caraway seeds.* L. E.

This is a very hot and pungent oil; a single drop is a moderate dose, and five or six a very large one. It is not unfrequently made use of as a carminative; and supposed by some to be peculiarly serviceable for promoting urine, to which it communicates some degree of its smell.

520. *Essential oil of cloves.* L. E.

This oil is so ponderous as to sink in water, and is not easily elevated in distillation: if the water which comes over be returned on the remaining cloves, and the distillation repeated, some more oil will generally be obtained, though much inferior in quality to the first. The oil of cloves is usually described as being "in taste excessively hot and fiery, and of a gold-yellow colour;" (*Boerb. process.* 27.) Such indeed is the composition which we receive under this name from Holland; but the genuine oil of cloves is one of the milder oils: it may be taken with great safety (duly diluted) to the quantity of 10 or 12 drops or more. Nor is its colour at all yellow, unless it has been long and carelessly kept, or distilled by too violent a fire: when in perfection, it is limpid and colourless; of a pleasant, moderately warm and pungent taste; and of a very agreeable smell, much resembling that of the spice itself.

521. *Essential oil of chamomile flowers.* L.

This is a very pungent oil, of a strong not ungrateful smell, resembling that of the flowers; its colour is yellow, with a cast of greenish or brown. It is sometimes given in the dose of a few drops, as a carminative, in hysterical disorders, and likewise as a vermifuge; it may be conveniently made into pills with crumb of bread.

422. *Oil of cinnamon.* L.

This valuable oil is extremely hot and pungent; of a most agreeable flavour, like that of the cinnamon itself. In cold languid cases, and debilities of the nervous system, it is one of the most immediate cordials and

and restoratives. The dose is one, two, or three drops; which must always be carefully diluted by the mediation of sugar, &c. for so great is the pungency of this oil, that a single drop let fall upon the tongue, undiluted, produces, as Boerhaave observes, a gangrenous eschar. In the distillation of this oil, a smart fire is required; and the low head, with a channel round it, above recommended for the distillation of the less volatile oils (n^o 512.), is particularly necessary for this, which is one of the least volatile, and which is afforded by the spice in exceeding small quantity.

523. *Essential oil of fennel-seeds.*

The oil obtained from sweet-fennel seeds is much more elegant and agreeable than that of the common fennel. It is one of the mildest of these preparations: it is nearly of the same degree of warmth with that of aniseeds, to which it is likewise similar in flavour, tho' far more grateful. It is given from two or three drops to 10 or 12, as a carminative, in cold indispositions of the stomach; and in some kinds of coughs, for promoting expectoration.

524. *Essential oil of juniper-berries.* L. E.

This oil is a very warm and pungent one; of a strong flavour, not unlike that of the berries. In the dose of a drop or two, it proves a serviceable carminative and stomachic; in one of six, eight, or more, a stimulating, detergent diuretic and emmenagogue: it seems to have somewhat of the nature of the turpentine, or their distilled oil; like which it communicates a violent smell to the urine.

The oil of these berries resides partly in vesicles spread through the substance of the fruit, and partly in little cells contained in the seeds; when the berry is dry, and the oil hardened into a resinous substance, it becomes visible, upon breaking the seeds, in form of little transparent drops. In order therefore to obtain this oil to advantage, we ought, previous to the distillation, to bruise the berry thoroughly, so as to break the seeds, and entirely lay open the oily receptacles.

525. *Essential oil of lavender-flowers.* L. E.

This oil, when in perfection, is very limpid, of a pleasant yellowish colour, extremely fragrant, possessing in an eminent degree the peculiar smell generally admired in the flowers. It is a medicine of great use, both externally and internally, in paralytic and lethargic complaints, rheumatic pains, and debilities of the nervous system. The dose is from one drop to five or six.

526. *Essential oil of bay-berries.*

The oil of bay-berries is thin and limpid, moderately pungent, of a strong and tolerably grateful smell. It is given in flatulent colics, hysterical complaints, and for allaying the pains consequent upon delivery; the dose from two drops to five or six. It is likewise made an ingredient in carminative glysters; and in some hysterical cases, is applied externally.

526. *Essence of lemons.* L.

This is a pleasant oil, of a fine smell, very near as agreeable as that of the fresh peel: it is one of the lightest and most volatile oils we have, perfectly limpid, and almost colourless. It is taken in doses of two

or three drops, as a cordial, in weakness of the stomach, &c. though more frequently used as a perfume.

528. *Essential oil of mace.*

The essential oil of mace is moderately pungent, very subtle and volatile, and of a strong aromatic smell like that of the spice itself: it is thin and limpid, of a pale yellowish colour, with a portion of thicker and darker-coloured oil at the bottom. This oil is celebrated in vomitings, hiccups, colicky pains, &c. celebly given internally from one to four drops, and applied externally to the stomach and umbilical region. It is, however, but rarely made use of, and not often met with in the shops.

529. *Essential oil of marjoram leaves.* L.

This oil is very hot and penetrating, in flavour not near so agreeable as the marjoram itself: when in perfection, it is of a pale yellow colour; by long keeping, it turns reddish: if distilled with too great a heat, it arises of this colour at first. It is supposed to be peculiarly serviceable in relaxations, obstructions, and mucous discharges of the uterus: the dose is one or two drops.

530. a. *Essential oil of the leaves of common mint.*

L. E.

This oil smells and tastes strongly of the mint, but is in both respects somewhat less agreeable than the herb itself. It is an useful stomachic medicine; and not unfrequently exhibited in want of appetite, weakness of the stomach, retchings to vomit, and other like disorders, when not accompanied with heat or inflammation: two or three drops, or more, are given for a dose.

530. b. *Essential oil of the leaves of pepper-mint.* L.

This possesses the smell, taste, and virtues of the pepper-mint in perfection; the colour is a pale greenish yellow. It is a medicine of great pungency and subtlety; and diffuses, almost as soon as taken, a glowing warmth through the whole system. In colics accompanied with great coldness, and in some hysterical complaints, it is of excellent service. A drop or two are in general a sufficient dose.

331. *Essential oil of nutmegs.* L. E.

The essential oil of nutmegs possesses the flavour and aromatic virtues of the spice in an eminent degree. It is similar in quality to the oil of mace, but somewhat less grateful.

532. *Essential oil of the leaves of origanum.* L. E.

This oil has a very pungent acrimonious taste, and a penetrating smell. It has been chiefly employed externally as an errhine, and for easing pains of the teeth.

533. *Essential oil of Jamaica pepper.* E.

This is a very elegant oil, and may be used as a succedaneum to those of some of the dearer spices. It is of a fine pale colour, in flavour more agreeable than the oil of cloves, and not far short of that of nutmegs. It sinks in water, like the oils of some of the eastern spices.

534. *Essential oil of rosemary.* L. E.

The oil of rosemary is drawn from the plant in flower.

flower. When in perfection, it is very light and thin; pale, and almost colourless; of great fragrancy, tho' not quite so agreeable as the rosemary itself. It is recommended, in the dose of a few drops, in nervous and hysterical complaints. Boerhaave holds it in great esteem against epilepsies, and suppressions of the uterine purgations, occasioned by weakness and inactivity.

535. *Essential oil of rue-leaves.* L.

The oil of rue has a very acrid taste, and a penetrating smell, resembling that of the herb, but rather more unpleasant. It is sometimes made use of in hysterical disorders, and as an anthelmintic; as also in epilepsies proceeding from a relaxed state of the nerves.

Rue yields its oil very sparingly. The largest quantity is obtained from it when the flowers are ready to fall off, and the seeds begin to show themselves: suitable maceration, previous to the distillation, is here extremely necessary.

536. *Essential oil of savin leaves.* L. E.

This oil is a celebrated uterine and emmenagogue; in cold phlegmatic habits, it is undoubtedly a medicine of good service, though not capable of performing what it has been usually represented to do. The dose is, two or three drops or more.

537. *Essential oil of saffraai.* L. E.

This is the most ponderous of all the known essential oils, but rises in distillation with sufficient ease: it appears limpid as water, has a moderately pungent taste, a very fragrant smell, exactly resembling that of the saffraai. It stands greatly commended as a sudorific, and for purifying the blood and juices: it is likewise supposed to be of service in humoral asthma and coughs. The dose is from one drop to eight or ten; though Geoffroy goes as far as 20.

The decoction remaining after the distillation of the oil, affords, by inspissation, an useful extract; of a mild, bitterish, subastrigent taste. Hoffman says, he has given it with great benefit, in doses of a scruple, as a corroborant in cachectic cases, in the decline of intermitting fevers, and for abating hypochondriacal spasms.

538. *Oil of turpentine.* L. E.

This is distilled in the same manner as the foregoing oils, and is strictly an essential one, though not usually ranked in this class: it is commonly, but improperly, called *spirit of turpentine*. It is employed in large quantities for some mechanic purposes, and hence the distillation of it is become a particular business.

This oil is a very hot, stimulating medicine. It is sometimes given as a sudorific and diuretic, in the dose of two or three drops: in larger doses, it is apt to greatly heat the body, occasion pain of the head, an effusion of the semen and liquor of the prostate glands. It has nevertheless been of late taken in considerable doses (along with honey or other convenient vehicles) against the sciatica; and, as is said, with good success. Some have recommended it against venereal runnings: but here it has produced mischievous consequences, inflaming the parts and aggravating the disorder. Externally it is not unfre-

quently employed against rheumatic pains, aches, sprains, for discharging cold tumours, and restraining hæmorrhages.

539. After the distillation of the turpentine, there remains in the still a brittle resinous substance, of a yellow colour, called *yellow resin* [L.]

The only use of this is in external applications, for giving consistence to plasters, and the like purposes.

540. Most of the foregoing oils are drawn by our chemists, and easily procurable in a tolerable degree of perfection; those of cinnamon, cloves, nutmegs, and mace, excepted. These are usually imported from abroad; and are for the most part so much adulterated, that it is difficult to meet with such as are at all fit for use.

Nor are the adulterations of these kinds of preparations easily discoverable. The groffer abuses indeed may be readily detected: thus if the oil is mixed with spirit of wine, it will turn milky on the addition of water; if with expressed oils, rectified spirit will dissolve the essential, and leave the other behind; if with oil of turpentine, on dipping a piece of paper in the mixture, and drying it with a gentle heat, the turpentine will be betrayed by its smell. But the more subtle artifice have contrived other methods of sophistication, which elude all trials of this kind.

Some have looked upon the specific gravity of oils, as a certain criterion of their genuineness. This, however, is not to be absolutely depended on; for the genuine oils, obtained from the same subject, oftentimes differ in gravity as much as those drawn from different ones. Cinnamon and cloves, whose oils usually sink in water, yield, if slowly and warily distilled, an oil of great fragrancy, which is nevertheless specifically lighter than the aqueous fluid employed in the distillation of it; whilst, on the other hand, the last runnings of some of the lighter oils prove sometimes too ponderous as to sink in water.

As all essential oils agree in the general properties of solubility in spirit of wine, indissolubility in water, miscibility with water by the intervention of certain intermedia, volatility in the heat of boiling water, &c. it is plain that they may be variously mixed with one another, or the dearer sophisticated with the cheaper, without any possibility of discovering the abuse by any trials of this kind. And indeed, it would not be of much advantage to the purchaser if he had infallible criteria of the genuineness of every individual oil. It is of as much importance, that they may be *good*, as that they may be *genuine*; for we have often seen genuine oils, from incautions distillation, and long and careless keeping, weaker both in smell and taste than the common sophisticated ones.

The smell and taste seem to be the only certain tests that the nature of the thing will admit of. If a bark should have in every respect the appearance of good cinnamon, and should be proved indisputably to be the genuine bark of the cinnamon tree; yet, if it wants the cinnamon flavour, or has it but in a low degree, we reject it: and the case is the same with the oil. It is only from use and habit, or comparison with specimens of known quality, that we can judge of the goodness, either of the drugs themselves, or of their oils.

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Most of the essential oils, indeed, are too hot and pungent to be tasted with safety; and the smell of the subject is so much concentrated in them, that a small variation in this respect is not easily distinguished. But we can readily dilute them to any assignable degree. A drop of the oil may be dissolved in spirit of wine; or received on a bit of sugar, and dissolved by that intermedium in water. The quantity of liquor which it thus impregnates with its flavour, or the degree of flavour which it communicates to a certain determinate quantity, will be the measure of the degree of goodness of the oil.

§ 2. SIMPLE DISTILLED WATERS.

541. THE effluvia which exhale in the air from many vegetables, particularly from those of the odorous kind, consist apparently of principles of great subtilty and activity, capable of strongly and suddenly affecting the brain and nervous system, especially in those whose nerves are of great sensibility; and likewise of operating, in a slower manner, upon the system of grosser vessels. Thus Boerhaave observes, that, in hysterical and dropical persons, the fragrant odour of the Indian hyacinth excites strange spasms, which the strong scent of rue relieves; that the effluvia of the walnut-tree occasion head-achs, and make the body colicive; that those of poppies procure sleep; and that the smell of bean-blossoms, long continued, disorders the senses. Lemery relates, from his own knowledge, that several persons were purged, by staying long in a room where damask-roses were drying.

Some of the chemists have indulged themselves in the pleasing survey of these *presiding spirits*, as they are called, of vegetables; their peculiar nature in the different species of plants; their exhalation into the atmosphere by the sun's heat, and dispersion by winds; their rendering the air of particular places medicinal, or otherwise, according to the nature of the plants that abound. They have contrived also different means for collecting these fugitive emanations, and concentrating and condensing them into a liquid form; employing either the native moisture of the subject, or an addition of water, as a vehicle or matrix for retaining them.

542. The process which has been judged most analogous to that of nature is the following: The subject, fresh gathered at the season of its greatest vigour, with the morning-dew upon it, is laid lightly and unbruised in a shallow vessel, to which is adapted a low lead with a recipient: under the vessel a live coal is placed, and occasionally renewed, so as to keep up an uniform heat, no greater than that which obtains in the atmosphere in summer, viz. about 85 degrees of Fahrenheit's thermometer. In this degree of heat, there arises, exceedingly slowly, an invisible vapour, which condenses in the head into dewy drops, and falls down into the receiver, and which has been supposed to be the very substance that the plant would have spontaneously emitted in the open air.

But on submitting to this process many kinds of odoriferous vegetables, liquors obtained by it have been always found to be very different from the natural effluvia of the respective subjects: they had very little smell, and no remarkable taste. It appeared,

that a heat, equal to that of the atmosphere, is incapable of raising in close vessels those parts of vegetables which they emit in the open air. It may therefore be presumed, that in this last case some other cause concurs to the effect: that it is not the sun's heat alone which raises and impregnates the air with the odorous principles of vegetables; but that the air itself, or the watery humidity with which it abounds, acting as a true dissolvent, extracts and imbibes them; so that the natural effluvia of the plant may be looked upon as an infusion of the plant made in air. The purgative virtue of the damask-rose, and the astringency of the walnut-tree, which, as above observed, are in some measure communicated to the air, may be totally extracted by infusion both in watery and spirituous menstrua, but never rise in distillation with any degree of heat: and the volatile odours of aromatic herbs, which are diffused through the atmosphere in the lowest warmth, cannot be made to distil without a heat much greater than is ever found to obtain in a shaded air.

The above process therefore, and the theory on which it is built, appear to be faulty in two points: (1.) In supposing, that all those principles which naturally exhale from vegetables, may be collected by distillation; whereas there are many which the air extracts in virtue of its dissolving power, and which are artificially separable also by dissolvents only: (2.) In employing a degree of heat insufficient for separating even those parts which are truly exhalable by heat.

643. The foregoing method of distillation is commonly called *distillation by the cold still*; but those who have practised it, have generally employed a considerable heat. A shallow leaden vessel is filled with the fresh herbs, flowers, &c. which are heaped above it, so that, when the head is fitted on, this also may be filled a considerable way: a little fire is made under the vessel, sufficient to make the bottom much hotter than the hand can bear, care being taken only not to heat it so far as to endanger scorching any part of the subject. If the bottom of the vessel is not made so hot as to have this effect on the part contiguous to it, it is not to be feared that the heat communicated to the rest of the included matter will be great enough to do it any injury. By this management, the volatile parts of feverish odorous plants, as mint, are effectually forced over; and if the process has been skilfully managed, the distilled liquor proves richly impregnated with the native odour and flavour of the subject, without having received any kind of disagreeable impression from the heat made use of.

This process has been chiefly practised in private families; the slowness of the distillation, and the attendance and care necessary for preventing the scorching of some part of the plant so as to communicate an ungrateful burnt flavour to the liquor, rendering it inconsistent with the dispatch requisite in the larger way of business.

544. Another method has therefore been had recourse to; that by the common still, called, in distinction from the foregoing, the *hot still*. Here a quantity of water is added to the plant, to prevent its burning: and the liquor is kept nearly of a boiling heat, or made fully to boil, so that the vapour rises plentifully into the head, and passing thence into a spiral pipe

or worm, placed in a vessel of cold water, is there condensed, and runs out into drops quickly succeeding one another, or in a continued stream. The additional water does not at all weaken the produce: for the most volatile parts of the subject rise first, and impregnate the liquor that first distils: as soon as the plant has given over its virtue sufficiently, which is known by examining from time to time the liquor that runs from the nose of the worm, the distillation is to be stopped.

This is the method of distillation commonly practised for the official waters. It is accompanied with one imperfection, affecting chiefly those waters whose principal value consists in the delicacy of their flavour; this being not a little injured by the boiling heat usually employed, and by the coagitation of the odorous particles of the subject with the water. Sometimes also a part of the plant sticks to the sides of the still, and is so far scorched as to give an ungrateful taint to the liquor.

545. There is another method of managing this operation, which we have already recommended for the distillation of the more volatile essential oils, and which is equally applicable to that of the waters. In this method, the advantages of the foregoing ones are united, and their inconveniences obviated. A quantity of water being poured into the still, and the herbs or flowers placed in a basket over it, there can be no possibility of burning; the water may be made to boil, but so as not to rise up into the basket, which would defeat the intention of this contrivance. The hot vapour of the water passing lightly through all the interstices of the subject matter, imbibes and carries out the volatile parts unaltered in their native flavour. By this means the distilled waters of all those substances, whose oils are of the more volatile kind, are obtained in the utmost perfection, and with sufficient dispatch; for which last intention the still may be filled quite up to the head.

546. In the distillation of essential oils, the water, as observed in the foregoing section, imbibes always a part of the oil. The distilled liquors here treated of, are no other than water thus impregnated with the essential oil of the subject; whatever smell, taste, or virtue, is here communicated to water, or obtained in the form of a watery liquor, being found in a concentrated state in the oil. The essential oil, or some part of it, more attenuated and subtilized than the rest, is the direct principle on which the title of *spiritus rector*, or presiding spirit, has been bestowed.

All these vegetables therefore which contain an essential oil, will give over some virtue to water by distillation: but the degree of the impregnation of the water, or the quantity of water which a plant is capable of satiating with its virtue, are by no means in proportion to the quantity of its oil. The oil satiates only the water that comes over at the same time with it: if there be more oil than is sufficient for this satiation, the surplus separates, and concretes in its proper form, not miscible with the water that arises afterwards. Some odoriferous flowers, whose oil is in so little quantity, that scarcely any visible mark of it appears, unless 50 or 100 pounds or more are distilled at once, give nevertheless as strong an impregnation to

water, as those plants which abound most with oil. Prepara-
tions.

547. General rules for the distillation of the official simple waters.

I. Plants and their parts ought to be fresh gathered.

Where they are directed fresh, such only must be employed; but some are allowed to be used dry, as being easily procurable in this state at all times of the year, though rather more elegant waters might be obtained from them whilst green [L.]

II. Having bruised the subject a little, pour thereon thrice its quantity of spring-water: this quantity is to be diminished or increased, according as the plants are more or less juicy than ordinary.

When fresh and juicy herbs are to be distilled, thrice their weight of water will be fully sufficient: but dry ones require a much larger quantity. In general, there should be so much water, that after all intended to be distilled has come over, there may be liquor enough left to prevent the matter from burning to the still.

III. The distillation may be performed in an alembic with a refrigeratory, the junctures being luted.

IV. The distillation is to be continued as long as the water which comes over is perceived to have any smell or taste of the plant.

Plants differ so much, according to the soil and season of which they are the produce, and likewise according to their own age, that it is impossible to fix the quantity of water to be drawn from a certain weight of them, to any invariable standard. The distillation may always be continued as long as the liquor runs well flavoured of the subject, and no longer.

If the herbs are of prime goodness, they must be taken in the weights prescribed. But when fresh ones are substituted to dry, or when the plants themselves are the produce of unfavourable seasons, and weaker than ordinary, the quantities are to be varied according to the discretion of the artist [L.]

After the odorous water, alone intended for use, has come over, an acidulous liquor arises, which has sometimes extracted so much from the copper-head of the still, as to prove emetic. To this are owing the anthelmintic virtues attributed to certain distilled waters.

V. If any drops of oil swim on the surface of the water, they are to be carefully taken off.

VI. That the waters may keep the better, about one-twentieth part their weight of proof-spirit may be added to each, after they are distilled. L.

548. A great number of distilled waters were formerly kept in the shops, and are still retained in foreign pharmacopœias. The faculty of Paris direct, in the last edition of their *codex medicamentarius*, no less than 125 different waters, and 130 different ingredients in one single water. Near one half of these preparations have scarcely any virtue or flavour from the subject, and many of the others are insignificant.

The colleges of London and Edinburgh have rejected these ostentatious superfluities: and given an elegant and compendious set of waters, sufficient for answering such purposes as these kinds of preparations are applied to in practice. Distilled waters are employed chiefly as grateful diluents, as suitable vehicles for medicines of greater efficacy, or for rendering disgusting ones more acceptable to the palate and stomach:

mach: few are depended on, in any intentions of consequence, by themselves.

549. *Simple alexeterial water.* L.

Take of spearmint leaves, fresh, a pound and a half: sea-wormwood tops fresh, angelica-leaves fresh, each one pound; water, as much as is sufficient to prevent an empyreuma. Draw off by distillation three gallons.

This water is sufficiently elegant with regard to taste and smell; though few expect from it such virtues as the title seems to imply. It is used occasionally for vehicles of alexipharmac medicines, or in juleps to be drank after them, as coinciding with the intention; but in general this water is not supposed to be itself of any considerable efficacy.

550. *Simple orange-peel water.* L.

Take of yellow peel of Seville oranges, dried, four ounces; water, as much as is sufficient to prevent burning. Distill off one gallon.

This water proves very weak of the orange-peel. It is designed for a diluter, in fevers, and other disorders where the stomach and palate are subject to receive quick disgust; in which cases (as the committee observe) cordial waters, especially if their use is to be long continued, ought to be but lightly impregnated with any flavour, however agreeable.

551. *Black cherry water.*

Let any quantity of black cherries be bruised, so as the stones may be broken; and then distilled according to art, with only a small proportion of water.

This is a very grateful water, and has long maintained a place in the shops. It has frequently been employed by physicians as a vehicle, in preference to the other distilled waters; and, among nurses and others who have the care of young children, has been the first remedy against the convulsive disorders to which children are so often subject.

This water has nevertheless of late been brought into disrepute; being, in consequence of certain experiments, looked upon by some as poisonous, and by most as at least suspicious. Wherefore both the London and Edinburgh colleges have chosen to lay it aside; more especially as it has been too often counterfeited with a water distilled from bitter almonds, which are known to communicate a poisonous quality.

552. a. *Simple cinnamon-water.* L.

Take of cinnamon, one pound; water, as much as will prevent burning. Distil off a gallon.

552. b. *Cinnamon-water without wine.* E.

Take of cinnamon, half a pound; water, one gallon and a half. Steep them together for two days; and then distil off one gallon.

This is a very grateful and useful water, possessing in an eminent degree the fragrance and aromatic cordial virtues of the spice. Great care should be had, in the choice of the cinnamon, to avoid the too common imposition of casia being substituted in its room: this latter yields a water much less agreeable than that of cinnamon, and whose flavour is manifestly empyreumatic.

The virtues of all these waters depend upon their containing a portion of the oil of the subject. The oil of cinnamon is very ponderous, and arises more difficultly than that of any of the other vegetable matters from which simple waters are ordered to be drawn. This observation directs us, in the distillation of this water, to make use of a quick fire, and a low vessel. For the same reason, the water does not keep so well as might be wished; the ponderous oil parting from it in time, and falling to the bottom, when the liquor loses its milky hue, its fragrant smell and aromatic taste. Some recommend a small proportion of sugar to be added, in order to keep the oil united with the water.

553. *Fennel water.* L.

Take of sweet-fennel seeds, one pound; water, as much as is sufficient to prevent an empyreuma. Distil off one gallon.

This water is a sufficiently grateful one. The leaves should be taken before the plant has run into flower; for after this time, they are much weaker and less agreeable. Some have observed, that the upper leaves and tops, before the flowers appear, yield a more elegant water, and a remarkably finer essential oil, than the lower ones; and that the oil obtained from the one swims on water, whilst that of the other sinks. No part of the herb, however, is equal in flavour to the seeds.

554. *Balm-water.*

This is prepared by distilling the green leaves of balm, as in the foregoing process.

In a former edition of the Edinburgh pharmacopœia, this water was ordained to be cohobated, or redistilled from fresh quantities of the herb. This management seems to have been taken from Boerhaave, who has a very high opinion of the water thus prepared: he says, he has experienced in himself, extraordinary effects from it, taken on an empty stomach; that it has scarce its equal in hypochondriacs and hysterical cases, the chlorosis, and palpitation of the heart, as often as these diseases proceed from a disorder of the spirits rather than from any collection of morbid matter.

But whatever virtues are lodged in balm, they may be much more perfectly and advantageously extracted by cold infusion in aqueous or spirituous menstrua: in this process, the liquor suffers no injury from being returned on fresh parcels of the herb; a few repetitions will load it with the virtues of subject, and render it very rich. The impregnation here is almost unlimited; but in distilled waters it is far otherwise.

555. *Mint-water.* E.

Take of spearmint leaves, fresh, any quantity; water, three times as much. Distil as long as the liquor which comes over has any taste or smell of the mint.

556. *Simple spearmint-water.* L.

Take of spearmint-leaves, dried, a pound and a half; water, as much as is sufficient to prevent burning. Draw off by distillation one gallon.

These waters smell and taste very strong of the mint; and prove in many cases useful stomachics. Boerhaave commends them (cohobated) as a present and

incomparable remedy for strengthening a weak stomach, and curing vomiting proceeding from cold viscous phlegm; as also in henteries.

557. *Simple peppermint-water.* L. E.

Take of peppermint leaves, dry, a pound and a half; water, as much as will prevent an empuyma. Draw off by distillation one gallon.

This is a very elegant and useful water; it has a warm, pungent taste, exactly resembling that of the peppermint itself. A spoonful or two, taken at a time, warm the stomach, and give great relief in cold, flatulent colics. Some have substituted a plain infusion of the dried leaves of the plant, which is not greatly different in virtue from the distilled water.

558. *Water of Jamaica pepper.* L.

Take of Jamaica pepper, half a pound; water, as much will prevent burning. Distil off one gallon.

This distilled water is a very elegant one, and has of late come pretty much into use: the hospitals employ it as a succedaneum to the more costly spice-waters. It is, however, inferior in gratefulness to the spirituous water of the same spice hereafter directed, (591.).

559. a. *Simple pennyroyal-water.* L.

Take of pennyroyal leaves, dry, a pound and a half; water, as much as will prevent burning. Draw off by distillation one gallon.

559. b. *Water of pennyroyal.* E.

Take of pennyroyal leaves, fresh, a pound and a half; water, as much as will prevent burning. Distil off a gallon.

This water possesses, in a considerable degree, the smell, taste, and virtues of the pennyroyal. It is frequently taken in hyteric cases, and not without good effects.

560. *Damask-rose water.*

Take of damask roses, fresh gathered, six pounds; water, as much as will keep them from burning. Distill off a gallon of the water. L.

Take of roses, six pounds; water, a sufficient quantity. Distil off one gallon. E.

This water is principally valued on account of its fine flavour, which approaches to that generally admired in the rose itself. The purgative virtue of the roses remains entire in the liquor left in the still, which has therefore been generally employed for making the solutive honey and syrup, instead of a decoction or infusion of fresh roses prepared on purpose; and this piece of frugality the college have now admitted.

561. *Rue-water.*

This is to be distilled from the fresh leaves of rue, and cohobated on fresh parcels of them, after the same manner as the balm-water, (554.)

Rue gives over in this process the whole of its smell, and great part of its pungency. The distilled water stands recommended in epileptic cases, the hyteric passion, for promoting perspiration and other natural secretions.

562. *Savin-water.*

Savin leaves, fresh, any quantity; water, three times

as much. Distil as long as the liquor runs well-flavoured of the plant.

This water is by some held in considerable esteem for the same purpose as the distilled oil of savin. Boerhaave relates, that he found it (when prepared by cohobation) to give an almost incredible motion to the whole nervous system; and that, when properly used, it proves eminently serviceable for promoting the menses, and the hæmorrhoidal flux.

§ 3. *SPIRITUOUS DISTILLED WATERS and SPIRITS.*

563. THE flavour and virtues of the distilled waters are owing, as observed in the preceding section, to their being impregnated with a portion of the essential oil of the subject from which they are drawn. Spirit of wine, considered as a vehicle for these oils, has this advantage above water, that it is their proper menstruum, and keeps all the oil, that rises from it, perfectly dissolved into an uniform limpid liquor.

Nevertheless, many substances, which, on being distilled with water, impart to it their virtues in great perfection; if treated in the same manner with spirit of wine, scarce give over to it any smell or taste. This difference proceeds from hence; that spirit is not susceptible of so great a degree of heat as water. Liquids in general, when made to boil, have received as great a heat as they are capable of sustaining: now, if the extent of the heat between freezing and boiling water, as measured by thermometers, be taken for a standard, spirit of wine will be found to boil with less than four-fifths of that heat, or above one-fifth less than the heat of boiling water. It is obvious therefore, that substances may be volatile enough to rise with the heat of boiling water, but not with that of boiling spirit.

Thus if cinnamon, for instance, be committed to distillation with a mixture of spirit of wine and water, or with a pure proof-spirit, which is no other than a mixture of about equal parts of the two; the spirit will arise first, clear, colourless, and transparent, and almost without any taste of the spice; but as soon as the more ponderous watery fluid begins to arise, the oil comes freely over with it, so as to render the liquor highly odorous, sapid, and of a milky hue.

The proof-spirits usually met with in the shops are accompanied with a degree of ill flavour; which, though concealed by means of certain additions, plainly discovers itself in distillation. This pauseous relish does not begin to arise till after the purer spirituous part has come over; which is the very time that the virtues of the ingredients begin also most plentifully to distil: and hence the liquor receives an ungrateful taint. To this cause principally is owing the general complaint, that the cordials of the apothecary are less agreeable than those of the same kind prepared by the distiller; the latter being extremely curious in rectifying or purifying the spirits (when designed for what he calls *fine goods*) from all ill flavour.

564. *Rectified spirit of wine,*

In the former edition of the Edinburgh pharmacopœia, was thus ordered:

Take any quantity of French brandy, and with a very gentle

gentle heat distil it to one half.

This rectified spirit, being digested for two days with one-fourth its quantity of dry salt of tartar in powder, and then distilled in a glass cucurbit, with a very gentle heat, becomes alcohol.

Spirits distilled from malt liquors, or other fermented substances, after being rectified in the above method, require further purification; namely, repeated distillation from an equal quantity of spring water.

565. French brandy is rather too dear an article in this country, for distillation; nor is the spirit obtained from it any ways preferable to one procurable from cheaper liquors. The coarser inflammable spirits may be rendered perfectly pure and fit for the nicest purposes, by the following method.

If the spirit is exceedingly foul, mix it with about an equal quantity of water, and distil with a slow fire; discontinuing the operation as soon as the liquor begins to run milky, and discovers, by its nauseous taste, that the impure and phlegmatic part is arising. By this treatment, the spirit leaves a considerable portion of its foul oily matter behind it in the water, which now appears milky and turbid, and proves highly disagreeable in taste. If the spirit was not very foul at first, this abatement is not necessary; if extremely so, it will be needful to repeat it once, twice, or oftener.

566. As vinous spirits arise with a less degree of fire than watery liquors, we are hence directed to employ, in the distillation of them, a heat less than that in which water boils: and if due regard be had to this circumstance, very weak spirits may, by one or two wary distillations, be tolerably well freed from their aqueous phlegm; especially if the distilling vessels are of such a height, that the spirit, by the heat of a water-bath, may but just pass over them: in such case, the phlegmatic vapours, which arise for a little way along with the spirit, will condense and fall back again before they can come to the head. Very pompous instruments have been contrived for this purpose, and carried in a spiral or serpentine form to an extraordinary height. The spirit, ascending through these, was to leave all the watery parts it contained, in its passage, and come over perfectly pure and free from phlegm. But these instruments are built upon erroneous principles, their extravagant height defeating the end it was designed to answer: if the liquor is made to boil, a considerable quantity of mere phlegm will come over along with the spirit; and if the heat is not raised to this pitch, neither phlegm nor spirit will distil. The most convenient instrument is the common still, betwixt the body of which, and its head, an adaptor or copper tube may be fixed.

567. The spirit being washed, as above directed, from its foul oil, and freed from the greatest part of the phlegm by gentle distillation in a water-bath, add to every gallon of it a pound or two of pure, dry, fixed alkaline salt. Upon digesting these together for a little time, the alkali, from its known property of attracting water and oils, will imbibe the remaining phlegm, and such part of the disagreeable unctuous matter as may still be left in the spirit, and sink with them to the bottom of the vessel. If the spirit be now again gently drawn over, it will arise entirely free

from its phlegm and nauseous flavour; but some particles of the alkaline salt are apt to be carried up with it, and give what the workmen call an *urinous relish*: This may be prevented, by adding, previous to the last distillation, a small proportion of calcined vitriol, alum, or sal catharticus amarus; the acid of these salts will unite with and neutralize the alkali, and effectually prevent it from arising; while no more of the acid of the salts is extricated than what the alkali absorbs.

The spirit obtained by this means is extremely pure, limpid, perfectly flavourless, and fit for the nicest purposes. It may be reduced to the strength commonly understood by proof, by mixing 20 ounces of it (by weight) with 17 ounces of water. The distilled cordials made with these spirits, prove much more elegant and agreeable, than when the common rectified or proof spirits of the shops are made use of.

If the rectified spirit be distilled afresh from dry alkaline salt with a quick fire, it brings over a considerable quantity of the salt; and in this state is supposed to be a more powerful menstruum for certain substances than the pure spirit. This alkalinized spirit is called *tartarized spirit of wine*.

568. The general virtues of vinous spirits have been already mentioned; (see MATERIA MEDICA, the Table.) The spirits impregnated with the volatile oils of vegetables, to be treated of in this section, have joined to those the aromatic, cordial, or other virtues which reside in the oils.

Art 1. Distilled Spirits.

569. *Compound balm-water, commonly called Eau de carmes.*

Take of balm in flower, fresh gathered and cleared from the stalks, two pounds; lemon peel, fresh, as soon as pared from the fruit, four ounces; coriander seeds, eight ounces; nutmegs, cloves, cinnamon, each, bruised, two ounces; angelica roots, dried and bruised, one ounce; spirit of wine, highly rectified, ten pints. Steep the several ingredients in the spirit four or five days; and then draw off, in the heat of a water-bath, 10 pints. Rectify the distilled liquor by a second distillation in a water-bath, drawing off only about eight pints and three quarters.

This process is taken from the *Elemens de pharmacie* of M. Baumé, who observes, that all the aromatic spirits ought to be prepared in the same manner. When the common spirits of this kind are rubbed on the hands, &c. they leave, after the more volatile parts have exhaled, a disagreeable empyreumatic smell; and when diluted with water, and taken medicinally, they leave in like manner a nauseous flavour in the mouth. To remedy these imperfections, he made many experiments, which showed, that in order to obtain these liquors of the desirable qualities, the spirit must not only be perfectly pure at first, but that the liquor ought also to be rectified after it has been distilled from the subjects. In this rectification only the more volatile, subtle, aromatic parts of the ingredients arise; there remains behind a white liquor, acrid, bitter, loaded only with the grosser oil, and deprived of all the specific flavour of the subjects. Indeed the very imperfection complained of naturally points out this second distillation for the remedy, as it shows the spi-
rits

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tions.

rit to contain a grateful and ungrateful matter; the first of which exhales, while the other is left behind.

Aromatic spirituous waters have in general less smell, when newly distilled, than after they have been kept about six months. M. Baumé suspects, that the preparations of this kind which have been most in vogue were such as had been thus improved by keeping; and found, that the good effects of age might be produced in a short time by means of cold. He plunges quart-bottles of the liquor into a mixture of pounded ice and sea-salt: the spirit, after having suffered for six or eight hours the cold hence resulting, proves as grateful as that which has been kept for several years. Simple waters also, after being frozen, prove far more agreeable than they were before; tho' they are always less so than those which have been drawn with spirit, and exposed to a like degree of cold. This melioration of distilled waters by frost was taken notice of by Geoffroy, *Hist. Acad.* 1713.

570. Spirit of rosemary. L.

Take of rosemary-tops, fresh gathered, a pound and a half; proof spirit, one gallon. Distil in the heat of a water-bath, till five pints are come over.

571. Hungary-water.

Take of rosemary flowers, just gathered, two pounds; rectified spirit of wine, one gallon. Put them together, and immediately distil in a water-bath. It is generally brought to us from abroad.

This spirit is very fragrant, inasmuch as to be in common use as a perfume: that brought from abroad is superior in fragrance to such as is generally made among us. In order to prepare it in perfection, the vinous spirit should be extremely pure, the rosemary-tops gathered when the flowers are full blown upon them, and committed immediately to distillation, particular care being taken not to bruise or press them. The best method of managing the distillation is that formerly recommended for the distillation of the more volatile essential oils and simple waters, viz. first to place the spirit in the still, and then set in above the liquor, either an iron hoop, with a hair-cloth stretched over it, upon which the flowers are to be lightly spread, or rather a basket, supported on three pins, reaching down to the bottom. A gentle heat being applied, just sufficient to raise the spirit, its vapour, lightly percolating through the flowers, will imbibe their finer parts, without making that disagreeable alteration which liquors applied to such tender subjects in their grosser form generally do. Probably the superiority of the French Hungary water to that prepared among us, is owing to some skilful management of this kind, or that recommended for the foregoing preparation, and employing a perfectly pure spirit.

572. Simple spirit of lavender. L.

Take of lavender-flowers, fresh gathered, a pound and a half; proof spirit, one gallon. Draw off, by the heat of a water-bath, five pints.

Take of fresh lavender-flowers, two pounds; rectified spirit of wine, one gallon. Distil off a gallon in a water-bath. E.

The same cautions are to be observed here as in the distillation of the foregoing spirit. Both of them,

Prepara-
tions.

when made in perfection, are very grateful and fragrant: they are frequently rubbed on the temples, &c. under the notion of refreshing and comforting the nerves; and likewise taken internally, to the quantity of a tea-spoonful, as warm cordials.

573. Compound spirit of lavender. L. E.

Take of simple spirit of lavender, three pints; spirit of rosemary, one pint; cinnamon, one ounce; cloves, nutmegs, each half an ounce; red saunders, three drams. Digest them together for seven days, and then strain out the spirit for use.

The red saunders is of no farther use [in the composition] than as a colouring ingredient. If a yellow spirit was liked, the yellow saunders would be an excellent article, as it not only communicates a fine colour, but likewise a considerable share of medicinal virtue. A spirit distilled from the flowers of lavender and sage, in due proportion, and digested in the cold for a little time with some cinnamon, nutmegs, and yellow saunders, proves a very elegant and grateful one.

This medicine has long been held in great esteem, under the name of *palsy-drops*, in all kinds of languors, weakness of the nerves, and decays of age. It may be conveniently taken upon sugar, from 10 to 80 or 100 drops.

574. An odoriferous spirit, called sweet honey-water.

Take of coriander seeds, honey, each one pound; cloves, an ounce and a half; nutmegs, benzoin, storax, each an ounce; vanilloes, in number four; yellow rind of three lemons; French brandy, one gallon. Digest these ingredients together for forty-eight hours; and then distil off the spirit in *balneo marie*. To one gallon of this spirit add orange-flower water, rose-water, of each one pound and a half; ambergris, musk, of each five grains. First grind the musk and ambergris with some of the water, and afterwards put all together in a large matras; shake them well, and let them circulate for three days and nights in a gentle heat; then suffer them to cool, filter the liquor, and keep it close stopped up for use.

575. Another.

Take of coriander seeds, one pound; lemon-peel fresh, nutmegs, each four ounces; ambergris, musk, each five grains; clean mclasses spirit, two gallons. Bruise the nutmegs and coriander seeds, and put them, with the lemon-peel and the spirit, into a small still placed in *balneo marie*: tie a thin cloth over the mouth, and sprinkle thereon the ambergris and musk reduced into fine powder: lute on the head; let the whole stand in digestion for twelve hours, and then distil as much as a boiling heat of the bath can force over. To this add, of rose-water, one pint; orange-flower water, half a pint.

These compositions are designed rather as perfumes than as medicines; though for such as can bear their fragrance, they might be used to advantage in this last intention. The musk and ambergris do not communicate so much of their smell as might be expected; and serve chiefly to heighten the flavour of the other ingredients; which these perfumes excellently do, when

when employed in very small proportion, to all the odoriferous simples, without imparting any thing perceptible of their own. Both the foregoing spirits are very agreeable; a few drops of either give a fine flavour to a large quantity of other liquor. Mr Willon, from whom the first is taken, (*Pract. Chem.* p. 354.), tells us, that he often made it for king James II. and that it gives one of the most pleasant scents that can be smelt to. The other is formed on the same plan, by omitting such articles as appeared superfluous in the first.

576. *Spirit of scurvy-grass.*

Take of fresh scurvy-grass, bruised, 10 pounds; rectified spirit of wine, five pints. Steep the herb in the spirit for 12 hours; then with the heat of a water-bath distil off five pints.

This spirit is very strong of the scurvy-grass; and may be given, in those cases where the use of this herb is proper, from 20 to 100 drops. The virtues of scurvy-grass reside in a very subtle volatile oil, which arises in distillation both with water and pure spirit; and, if the liquors are exposed to the air, soon exhales from both. The spirit, newly distilled, is extremely pungent; but if long kept, even in close vessels, becomes remarkably less so.

577. *Golden or purging spirit of scurvy-grass.*

Take of spirit of scurvy-grass, one pound; gamboge, one ounce. Dissolve the gamboge in the spirit; and if any sediment falls to the bottom, carefully decant the tinged liquor from it. This spirit is otherwise made with scammony, or resin of jalep, instead of gamboge.

This has been in great esteem among the common people, and strongly recommended by the venders, in all kinds of scorbutic disorders. It is nevertheless a very indifferent medicine, and little deserves the pompous title given it. It may be taken from 20 to 60 drops, either upon sugar or mixed with syrup.

Art. 2. *Distilled Spirituous Waters.*

578. By *distilled Spirits*, are understood such as are drawn with a spirit that has been previously rectified, or which is reduced nearly to that strength in the operation: by *Spirituous Waters*, those in which the spirit is only of the proof strength, or contains an admixture of about an equal measure of water. These last have been usually called *compound waters*, even when distilled from one ingredient only; as those, on the other hand, which are drawn by common water, tho' from a number of ingredients, are named *simple*; the title *simple*, here, relating not to simplicity in respect of composition, but to the vehicle being plain water. The Edinburgh pharmacopœia denominates those waters *simple* which are drawn from a single ingredient, whether the vehicle be common water or spirituous water, and all those *compounds* which are distilled from more than one.

579. *General rules for the distillation of Spirituous Waters.*

I. The plants and their parts ought to be moderately and newly dried, except such as are ordered fresh gathered.

II. After the ingredients have been steeped in the spirit for the time prescribed, add as much water as will be sufficient to prevent an empyreuma, or rather more.

III. The liquor which comes over first in the distillation, is by some kept by itself, under the title of *spirit*; and the other runnings, which prove milky, fined down by art. But it is better to mix all the runnings together without fining them, that the waters may possess the virtues of the plant entire; which is a circumstance to be more regarded than their fineness or lightness.

IV. In the distillation of these waters, the genuine brandy obtained from wine is directed. Where this is not to be had, take, instead of that proof spirit, half its quantity of a well-rectified spirit prepared from any other fermented liquors: in this steep the ingredients, and then add spring-water enough both to make up the quantity ordered to be drawn off, and to prevent burning.

580. By this method more elegant waters may be obtained than when any of the common proof-spirits, even that of wine itself, are made use of. All vinous spirits receive some flavour from the matter from which they are extracted; and this flavour, which adheres chiefly to the phlegm or watery part, they cannot be divested of without separating the phlegm, and reducing them to a rectified state.

581. *Spirituous alexeterial water.* L.

Take of spearmint leaves, fresh, half a pound; angelica leaves, fresh, sea-wormwood tops, fresh, each four ounces; proof-spirit, one gallon; water, as much as will prevent burning. Distil off one gallon.

This is a tolerably pleasant water; it is looked upon as an alexipharmac and stomachic, and in these intentions is not unfrequently made use of in juleps, &c.

582. *Spirituous alexeterial water with vinegar.* L.

Take of spearmint leaves, angelica leaves, each half a pound; sea-wormwood tops, four ounces; proof-spirit, one gallon; water, as much as is sufficient to prevent burning; vinegar, one pint. Distil the fresh herbs with the spirit and water, drawing off one gallon; to which add the vinegar.

Angelica, after trial of sundry other materials, has been found the most effectually to remove the disagreeable flavour which the vinegar would otherwise communicate, and therefore this plant is ordered in a larger proportion here than in the other alexeterial waters. Perhaps it would be more eligible to add the vinegar occasionally; for when mixed with the liquor at first, it is apt to throw down, upon keeping, some of the more valuable parts which the water received from the herbs.

583. *Compound aniseed water.* L.

Take of aniseeds, angelica seeds, each half a pound; proof-spirit, one gallon; water, as much as is sufficient to prevent burning. Draw off by distillation one gallon.

This is a very elegant aniseed water, the angelica seeds greatly improving the flavour of the anise: it is apt to turn out milky, if drawn so low as here ordered.

Prepara-
tions.584. *Spirituos orange-peel water.* L.

Take of the outer rind of Seville-orange-peel, dried, half a pound; proof-spirit, one gallon; water, as much as is sufficient to prevent an empyreuma. Distill off one gallon.

This is considerably stronger of the orange-peel than the simple water. It is used as a cordial, stomachic, and carminative.

585. *Cardamom-feed water.* L.

Take of lesser cardamom seeds, freed from the husks, four ounces; proof-spirit, one gallon; water, as much as is sufficient to prevent burning. Distill off one gallon.

This water is a grateful cordial and carminative, the cardamom seeds giving over in this process the whole of their flavour. It is not perhaps very necessary to be at the trouble of separating the husks, for these communicate nothing disagreeable; the only difference is, that if employed unhusked, a proportionably larger quantity of them must be taken.

586. *Caraway-water.* L. E.

Take of caraway seeds, half a pound; proof-spirit, one gallon; water, as much as will prevent burning. Distill off one gallon.

This is a cordial in common use; it contains the flavour of the caraway seeds in perfection.

587. *Spirituos cinnamon-water.* L.

Take of cinnamon, a pound; proof-spirit, a gallon; water, so much as will prevent burning. Draw off by distillation one gallon.

588. *Cinnamon-water with wine.* E.

Take of cinnamon, half a pound; proof-spirit, one gallon. Distill off one gallon.

This is a very agreeable and useful cordial water, but not so strong of the cinnamon as might be expected; for very little of the virtues of the spice arise till after the pure spirituous part has distilled.

In the *pharmacopœia reformata*, it is proposed to make this water, by mixing the simple cinnamon water (553, a.) with somewhat less than an equal quantity of rectified spirit: on shaking them together, the liquor loses its milky hue, soon becomes clear, and more elegant than the water distilled as above; it is equally strong of the cinnamon, and free from the nauseous taint which the common proof-spirits are impregnated with.

589. *Compound juniper-water.* L. E.

Take of juniper-berries, one pound; sweet-fennel seeds, caraway seeds, each an ounce and a half; proof-spirit, one gallon; water, as much as is sufficient to prevent burning. Distill off one gallon.

This water, mixed with about an equal quantity of the rob of juniper-berries, proves an useful medicine in catarrhs, debility of the stomach and intestines, and difficulty of urine. The water by itself is a good cordial and carminative: the service which this and other spirituous waters do in these intentions, is too commonly known; though the ill consequences that follow their constant use, are too little regarded.

Prepara-
tions.590. a. *Spirituos pepper-mint water.* L.

Take of peppermint-leaves, dry, a pound and a half; proof-spirit, a gallon; water, as much as is sufficient to prevent an empyreuma. Draw off by distillation one gallon.

This water is made use of in flatulent colics and other like disorders; in which it oftentimes gives immediate relief. It smells and tastes strongly of the pepper-mint.

590. b. *Spirituos mint-water.* L.

Take of spearmint leaves, dry, a pound and a half; proof-spirit, a gallon; water, as much as will prevent burning. Distill off one gallon.

This water, if the spirit be good, turns out a very elegant one, and preferable, in weakness of the stomach, retching to vomit, and the like, to many more elaborate preparations. Where the disorder is not accompanied with heat or inflammation, half an ounce of this water may be given diluted with some agreeable aqueous liquor.

591. *Spirituos Jamaica-pepper water.*

Take of Jamaica pepper, half a pound; proof-spirit, three gallons; water, a sufficient quantity to prevent an empyreuma. Draw off by distillation three gallons.

This water is far more agreeable than a simple water drawn from the same spice; and has long had a place among the cordials both of the distiller and apothecary; though it has not yet been received into any public pharmacopœia.

592. *Nutmeg water.* L.

Take of nutmegs, two ounces; proof-spirit, a gallon; water, as much as will prevent burning. Draw off by distillation one gallon.

This water (with the addition only of some hawthorn flowers, an article of very little significance) was formerly celebrated in nephritic disorders, under the name of *aqua nephritica*. At present, it is regarded only as an agreeable spirituous liquor, lightly impregnated with the nutmeg flavour.

593. *Spirituos pennyroyal water.* L.

Take of pennyroyal leaves, dry, a pound and a half; proof-spirit, a gallon; water, as much as will prevent burning. Distill off one gallon.

This water has a good share of the flavour of the pennyroyal, and is pretty much in use as a carminative and antihysteric.

594. *Compound horseradish water.*

Take of garden scurvygras leaves, fresh, four pounds; horseradish root fresh, orange-peel fresh, each two pounds; nutmegs, nine ounces; proof-spirit, two gallons; water, a sufficient quantity to prevent burning. Draw off by distillation two gallons. L.
Take of horseradish root, three pounds; rectified spirit of wine, four pints. Distill off four pints in a water-bath, and to the distilled liquor add eight pints of simple Jamaica-pepper water. E.

Both these waters are very elegant ones, and as well adapted

adapted for the purposes of an antiscorbutic, as any thing that can well be contrived in this form.

Mustard-seed, though not hitherto employed in these kinds of compositions, should seem to be an excellent ingredient; it gives over the whole of its pungency, and is likewise less perishable than most of the other substances of this class: this seed wants no addition, unless some aromatic material to furnish an agreeable flavour.

SECT. VI. Concentration of the medicinal parts of Juices and Infusions by Evaporation.

595. WHEN vegetable juices, or watery or spirituous decoctions or infusions, are exposed to a continued heat, the fluid, gradually evaporating, carries off with it such volatile matters as it was impregnated with, and leaves the more fixed united together into one mass. As the object of the preceding section was the collection of the volatile principle which exhales along with the fluid, that of the present is this re-union and concentration of the fixed matter. The mass which remains from the evaporation of the expressed juice of a plant, is called an *inspissated juice*; from watery decoctions or infusions, an *extract*; from spirituous tinctures, a *resin*, or *essential extract*. The term *extract* is frequently used also as a general appellation of all the three kinds. Inspissated juices and watery decoctions, particularly the former, when evaporated no further than to the consistence of oil or honey, are called *rob* or *sapa*; and spirituous tinctures, reduced to a like consistence, are called *balsam*.

§ I. INSPISSATED JUICES.

596. WHAT relates to the expression of juices, has already been delivered in Sect. II. with the most effectual means of preserving them in their liquid state, and a general account of what substances do or do not give out their virtues with their juices. In the inspissation of juices, there is further to be considered the volatility or fixity of their medicinal parts: if a plant loses its virtue, or part of its virtue, in being dried, it is obvious that the juice must lose as much in being inspissated to dryness, how gentle soever the heat be with which the inspissation is performed. It is likewise to be observed, that the medicinal parts of some juices are kept in a state of perfect solution by the watery fluid, so as to be completely retained by it after the liquor has been made fine by settling, straining, or other means; while the medicinal parts of others, not dissoluble by watery menstrua, are only diffused through the liquor in the same manner as the feculences are, and separate along with these on standing.

597. Rob of elder-berries.

Let the depurated juice of elder-berries be inspissated with a gentle heat. *L.*

This preparation, made with or without sugar, keeps well, and proves a medicine of considerable importance as an aperient, generally promoting the natural excretions by stool, urine, or sweat. The dose is from a dram or two to an ounce or more. A spoonful, diluted with water, is usefully taken in common colds at bed-time.

598. Inspissated juice of sloes, or German acacia.

Let any quantity of the juice of unripe sloes be inspissated over a gentle fire.

This juice is inspissated nearly to dryness, care being taken to prevent its burning, as directed in the following §; for making extracts with water. It is a moderately strong astringent, similar to the Egyptian acacia, for which it has been commonly substituted in the shops. It is given in fluxes and other disorders where styptic medicines are indicated, from a scruple to a dram.

599. Extract of plantane.

Let any quantity of the juice of plantane-leaves be depurated; either by suffering it to settle, and then decanting off the clear liquor; or by straining; or by clarification by whites of eggs. Afterwards evaporate the juice in a sand-heat, to the consistence of honey. After the same manner, extracts may be made from all acid, cooling, styptic, juicy plants.

This is a method of treating plants very little practised; but which promises, if duly prosecuted, to afford medicines of considerable power. There are many common and neglected herbs, as plantane, chickweed, chervil, &c. whose juices in their dilute state, as well as the herbs in substance, seem to be altogether insignificant, but which, when the juice is well depurated from the feculent matter, and concentrated by the evaporation of the fluid, yield extracts which discover to the taste no small activity. These extracts, like those prepared from the juices of most of the summer-fruits, if inspissated to dryness, grow moist again in the air.

600. Extract of hemlock.

See n° 249.

This is the preparation of hemlock lately published at Vienna by Dr Storck; who recommends it as a high resolvent in many obtinate disorders, where the common remedies avail nothing. He observes, that small doses should always be begun with, as two grains, made into a pill, twice a-day; and that, by gradually increasing the dose, it may be given to two, three, or even four drams a-day, and continued in such quantities for several weeks: that it may be used with safety, in infancy, old age, and pregnancy; that it neither accelerates nor disturbs the circulation; neither heats nor cools; nor affects the animal-functions: that it increases the secretions, and renders the mouth moist; seldom purges; very rarely vomits; sometimes augments perspiration; often produces a copious discharge of viscid urine; but in many patients does not increase any of the sensible evacuations: that it removes obstructions and their consequences; relieves rheumatic pains, though of long continuance; dissolves scirrhus tumours, both internal and external; and cures dropsies and consumptions proceeding from scirrhusities; that it often dissolves cataracts, or stops their progress, and has sometimes removed the gutta serena: that it inveterate cutaneous eruptions, scald-heads, malignant ulcers, cancers, the malignant fluor albus and gonorrhoea of long standing, obtinate remains of the venereal disease, and caries of the bones, generally yield to it: that for the most part it is ne-

cessary to continue this medicine for a very considerable time, before the cure is effected, or much benefit perceived from it : that in some cases it failed of giving any relief, and that he met with some persons who could not bear its effects ; and that consequently there must be some latent difference in the habit, the diagnostic signs of which are at present unknown : that though it is by no means infallible, any more than other medicines in their respective intentions, yet the great number of deplorable cases that have been happily cured by it is sufficient to recommend it to further trials. The efficacy of this medicine is confirmed by many eminent practitioners abroad ; though the trials hitherto made of it in this country have not been attended with much success. Somewhat, perhaps, may depend upon the time of the plant's being gathered, and the manner of the preparation of the extract. Dr Storck himself takes notice of some mistakes committed in this respect : some have left the herb in a heap for several days, whence part of it withered, part rotted, and the juice became thick and mucilaginous : others have taken a very large quantity of the juice, and boiled it down in copper vessels with a great heat, by which means a strong fetor was diffused to a considerable distance, and the most efficacious parts dissipated : others, with officious care, have clarified the juice, and thus obtained a black tenacious extract, retaining but a small degree of the specific smell of the plant : the extract duly prepared, according to the prescription above referred to, is of a greenish brown colour, and a very disagreeable smell, like that of mice. But though there is reason to believe, that much of the extract used here had been ill prepared, we can by no means admit that its general inefficacy was owing to this cause ; for though there are few instances of its discovering any valuable medicinal powers, there are several of its having activity enough, even in small doses, to produce alarming symptoms.

601. *Elaterium.*

Slit ripe wild cucumbers, and having very lightly pressed out the juice, pass it thro' a fine hair-sieve into a glazed earthen vessel. After standing for some hours, the thicker part will fall to the bottom ; from which the thinner is to be poured off, and what liquid matter is still left is to be separated by filtration. The remaining thick part is to be covered with a linen cloth, and exposed to the sun, or other gentle heat, till grown thoroughly dry. L.

Preparations of this kind have been commonly called *fecule*. The filtration above directed, for draining off such part of the watery fluid as cannot be separated by decantation, is not the common filtration through paper, for this does not succeed here : the grosser parts of the juice, falling to the bottom, form a viscid cake upon the paper, which the liquid cannot pass through. The separation is to be attempted in another manner, so as to drain the fluid from the top : this is effected by placing one end of some moistened strips of woollen cloth, skins of cotton, or the like, in the juice, and laying the other end over the edge of the vessel, so as to hang down lower than the surface of the liquor : by this management the separation succeeds in perfection.

Elaterium is a strong irritating cathartic, and often-

times operates also as an emetic. It is never to be ventured on but in indolent phlegmatic habits, as in dropsies, in which it is by some particularly recommended. Two or three grains are in general a sufficient dose.

§ 2. EXTRACTS WITH WATER.

602. These extracts are prepared, by boiling the subject in water, and evaporating the strained decoction to a thick consistence.

This process affords us some of the more active parts of plants, free from the useless indissoluble earthy matter, which makes the largest share of their bulk. There is a great difference in vegetable substances, with regard to their fitness for this operation ; some yielding to it all their virtues, and others scarce any. Those parts in which the sweet, glutinous, emollient, cooling, bitter, austere, astringent, virtues reside, are for the most part totally extracted by the boiling water, and remain almost entire upon evaporating it : whilst those which contain the peculiar odour, flavour, and aromatic quality, are either not extracted at all, or exhale along with the menstruum. Thus gentian root, which is almost simply bitter, yields an extract possessing, in a small volume, the whole taste and virtues of the root : wormwood, which has a degree of warmth and strong flavour joined to the bitter, loses the two first in the evaporation, and gives an extract not greatly different from the foregoing ; the aromatic quality of cinnamon, is dissipated by this treatment, its astringency remaining : whilst an extract made from the flowers of lavender and rosemary, discovers nothing either of the taste, smell, or virtues of the flowers.

General rules for making extracts with water.

I. It is indifferent, in regard to the medicine, whether the subject is used fresh or dry ; since nothing that can be preserved in this process, will be lost by drying. In regard to the facility of extraction, there is a very considerable difference ; vegetables in general giving out their virtues more readily, when moderately dried, than when fresh.

II. Very compact dry substances should be reduced into exceeding small parts, previous to the affusion of the menstruum.

III. The quantity of water ought to be no greater than is necessary for extracting the virtues of the subject. A difference herein will sometimes occasion a variation in the quality of the product : the larger the quantity of liquor, the longer fire will be requisite for evaporating it, and consequently the more of the volatile parts of the subject will be dissipated. A long-continued heat likewise makes a considerable alteration in the matter which is not volatile : sweet substances, by long boiling with water, become nauseous ; and the drastic purgatives lose their virulence, tho' without any remarkable separation of their parts.

IV. The decoctions are to be depurated by colature ; and afterwards suffered to stand for a day or two, when a considerable quantity of sediment is usually found at the bottom. If the liquor, poured off clear, be boiled down a little, and afterwards suffered to cool again, it will deposit a fresh sediment, from which it may be decanted before you proceed to finish the

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tions.

the evaporation. The decoctions of very refinous substances do not require this treatment, and are rather injured by it; the resin subfiding along with the inactive dregs.

V. The evaporation is most conveniently performed in broad shallow vessels: the larger the surface of the liquor, the sooner will the aqueous parts exhale: this effect may likewise be promoted by agitation.

VI. When the matter begins to grow thick, great care is necessary to prevent its burning. This accident, almost unavoidable if the quantity is large, and the fire applied as usual under the evaporating pan, may be effectually secured against, by carrying on the inspissation after the common manner, no farther than to the consistence of a syrup, when the matter is to be poured into shallow tin or earthen pans, and placed in an oven, with its door open, moderately heated; which acting uniformly on every part of the liquid, will soon reduce it to any degree of consistence required. This may likewise be done, and more securely, in *balneo marie*, by setting the evaporating vessel in boiling water; but the evaporation is here exceeding slow and tedious.

VII. Extracts are to be sprinkled with a little spirit of wine, to prevent their growing mouldy. *L.* They should be kept in bladders moistened with sweet oil. *E.*

603. *Extract of wormwood.*

Boil dried wormwood leaves in water, supplying fresh water occasionally till the herb has given out all its virtues to the liquor. Strain the decoction through a woollen cloth, and evaporate it, in a sand-bath, to the consistence of honey.

This extract is almost simply bitter; the peculiar flavour of the wormwood being dissipated in the evaporation. The chemists usually prepare the extract of wormwood from the decoction which remains in the still after the distillation of the essential oil: and, provided the still has been perfectly clean, and the liquor not stood too long in it after the distillation, this piece of frugality is not to be disapproved of; since, whether we catch the exhaling vapour, or suffer it to be dissipated in the air, the remaining extract will be the same.

604. *Extract of lesser centaury.*

This is directed to be prepared in the same manner as the preceding. It is the oldest extract we have any account of: its preparation is very accurately and circumstantially set down in a book usually ascribed to Galen, *De virtute centaureæ*. The author of that treatise recommends the extract as a medicine of excellent service in many cases; and looks upon centaury as a specific against the bite of a mad dog and other venomous animals. It is doubtless an useful bitter; possessing the general virtues of the substances of that class; but cannot well be supposed to have any others.

605. *Extract of chamomile.*

This extract is prepared from the flowers of chamomile, in the same manner as those of the leaves of the two preceding plants. Nor is it greatly different from those extracts in quality; the specific flavour of

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tions.

the chamomile exhaling in the evaporation. The chemists commonly prepare it, like that of wormwood, from the decoction remaining after the distillation of the essential oil.

606. *Extract of elecampane. L.*

Boil the roots of elecampane in water, press out and strain the decoction, and set it by to settle. Then pour off the clear liquor, and boil it down to a pilular consistence; taking care, towards the end, to prevent its burning to the vessel.

This extract retains a considerable share of the virtues of the root: its taste is somewhat warm, and not ungratefully bitterish. It is given, from a scruple to a dram, in a lax state of the fibres of the stomach, and in some disorders of the breast.

607. *Extract of gentian. L. E.*

This extract is prepared from the roots of gentian, in the same manner as the foregoing extracts. It is of a reddish brown colour, and an intensely bitter taste, being one of the strongest of the vegetable bitters.

608. *Extract of liquorice. L.*

Lightly boil fresh liquorice roots in water, press the decoction through a strainer; and after the fæces have subsided, evaporate it until it no longer sticks to the fingers; taking care, towards the end of the operation, to prevent an empyreuma.

It is convenient, before boiling the root, to cut it transversely into small pieces, that it may more readily give out its virtues by light coction: if the boiling is long continued, the rich sweet taste, for which this preparation is valued, will be greatly injured. For the same reason, the quantity of water ought to be no larger than is absolutely necessary to extract the virtues of the root: a quart, or at most three pints, will be fully sufficient for a pound of liquorice. It would be of considerable advantage to the preparation, and probably (when made in quantity) less expensive to the preparer, to use, instead of the decoction, juice of liquorice, pressed out betwixt iron rollers, after the manner practised abroad for obtaining the juice of the sugar-cane.

Large quantities of extract of liquorice have been usually brought to us from Spain and other foreign countries; but it is very rarely met with in the shops in perfection; the makers of this commodity, both at home and abroad, being either very slovenly in its preparation, or designedly mixing it with sand and other impurities. When made with due care, it is exceedingly sweet, not at all bitterish or nauseous, more agreeable in taste than the root itself, of a pleasant smell, a reddish brown colour, and, when drawn out into strings, of a bright golden colour; totally soluble in water, without depositing any fæces.

This preparation would be very convenient for many purposes in the shops, if kept in a somewhat softer consistence than that of an extract. The only inconvenience attending this soft form is, its being apt in a short time to grow mouldy; but this may be effectually prevented, by the addition of a small portion of spirit of wine.

Prepara-
tions.609. *Extract of black hellebore. L. E.*

This extract is prepared from the roots of black hellebore, in the same manner as that of elecampane roots above described. It purges with considerably less violence than the hellebore in substance; and appears to be one of the best preparations of that root, when intended to act only as a cathartic. The dose is from 8 or 10 grains to 15 or more.

610. *Extract of logwood. L.*

Take of logwood, reduced to powder, one pound. Boil it in a gallon of water till half the liquor is consumed, repeating the coction with fresh water four times, or oftener: the several decoctions are to be mixed together, passed through a strainer, and evaporated to a due consistence.

This extract has an agreeable sweet taste, with some degree of astringency; and hence becomes serviceable in diarrhoeas, for blunting the acrimony of the juices, and moderately constringing the intestines and orifices of the smaller vessels: It may be given from a scruple to half a dram, and repeated five or six times a-day to advantage. During the use of this medicine, the stools are frequently tinged red by it; which has occasioned some to be alarmed, as if the colour proceeded from blood: the prescriber therefore ought to caution the patient against any surprise of this kind.

611. *Extract of Peruvian bark, soft and hard. L.*

Boil a pound of powdered bark in five or six quarts of water for an hour or two, and pour off the liquor; which whilst hot will be red and transparent, but on growing cold becomes yellow and turbid. The remaining bark is to be boiled again in the same quantity of water as before; and this process repeated till the liquor remains transparent when cold. All the decoctions, strained and mixed together, are to be evaporated over a very gentle fire to a due consistence, care being taken to prevent the matter from burning.

This extract is directed to be kept in the shops, both in a soft and a hard form; the first of a proper consistence for making into pills; the other fit for being reduced into powder.

612. *Extract of guaiacum wood, soft and hard. L.*

Boil a pound of shavings of guaiacum in a gallon of water till half the liquor is wasted, repeating the operation four times, or oftener, with the same quantities of fresh water. The several decoctions, passed through a strainer, are to be mixed and inspissated together; when the aqueous parts are almost entirely exhaled, a little rectified spirit of wine is to be added, that the whole may be reduced into a uniform and tenacious mass. This extract is to be prepared as the foregoing, in a soft and hard form.

Here the resinous parts of the wood, which were boiled out with the water, are apt to separate towards the end of the inspissation: Hence an addition of spirit becomes necessary to keep them united with the rest of the matter. The extract agrees in virtue with the wood. See GUAIACUM.

Prepara-
tions.613. *Extract of rue. L.*

This is prepared from the leaves of rue, in the same manner as that of elecampane roots already described. It retains a considerable share of the warmth and pungency of the rue; for though the principal virtues of rue reside in an essential oil, yet the oil of this plant, as formerly observed under the head of those preparations, is not of a very volatile kind.

614. *Extract of savin. L.*

This extract is prepared from the leaves of savin in the same manner as the preceding. It does not retain so much as that extract does of the virtues of its subject, the oil of savin being more volatile than that of rue.

615. *Gum and resin of aloes. L.*

Boil four ounces of socotorine aloes in two pints of water till as much as possible of the aloes is dissolved. The solution suffered to rest for a night, will deposit the resin to the bottom of the vessel: after which, the remaining liquor, strained, if needful, is to be evaporated, that the gum may be left.

The gum of aloes is somewhat less purgative, and considerably less disagreeable, than the crude juice.

616. *The pills or extract of Rudiis.*

Take of black-hellebore roots, colocynth, socotorine aloes, each two ounces; scammony, one ounce; vitriolated tartar, two drams; distilled oil of cloves, one dram. Bruise the colocynth and hellebore, pour on them two quarts of water, and boil to the consumption of half the liquor: pass the decoction through a strainer, and evaporate it to the consistence of honey, adding the aloes and scammony reduced into fine powder: when the mass is taken from the fire, mix into it the vitriolated tartar and distilled oil.

This preparation is a medicine of great importance as a cathartic.

617. *Rob of juniper-berries.*

Let juniper-berries, thoroughly bruised, be boiled in a sufficient quantity of water, the liquor strained, and inspissated to the consistence of honey.

This preparation may be made also from the decoction that remains after the distillation of the essential oil of the berries. It has a sweet balsamic taste, accompanied with a greater or less bitterness, according as the seeds of the berry were more or less thoroughly bruised. This elegant preparation, though not received in our pharmacopœias, seems not unworthy of a place in the shops. Hoffman has a great opinion of it in debilities of the stomach and intestines, and in the difficulties of urine familiar to persons of an advanced age.

618. Besides the above extracts, there are ordered, in the present edition of the Edinburgh pharmacopœia, one from the heads of puppies; another from the seeds of hemlock scarce come to maturity; and a third from the leaves of *pulsatilla nigricans*. They are to be made in the same manner with the extract of gentian, n° 607.

§ 3. EXTRACTS WITH RECTIFIED SPIRITS.

619. RECTIFIED spirit of wine dissolves the essential oils and resins of vegetables, and does not readily carry off the oil in its exhalation, the heat sufficient to exhale pure spirit being much less than that in which water considerably evaporates, or most essential oils distil. Hence a resinous or spirituous extract of wormwood, contrary to that made with water, contains the warmth and flavour as well as bitterness of the herb; one made from cinnamon possesses its aromatic virtue, as well as its astringency; and one from lavender and rosemary flowers retains great part of their flavour and virtues; the volatile parts, which are carried off by water in its evaporation, being left behind by spirit.

The spirit employed for this purpose should be perfectly free from any ill flavour, which would be communicated in part to the preparation; and from any admixture of phlegm or water, which would not only vary its dissolving power, but, likewise evaporating towards the end of the inspissation, would promote the distillation of the volatile parts of the subject. Hence also the subject itself ought always to be dry: those substances which lose their virtue by drying, lose it equally on being submitted to this treatment with the purest spirit.

The inspissation should be performed from the beginning in the gentle heat of a water-bath. It is not needful to suffer the spirit to evaporate in the air: greatest part of it may be recovered by collecting the vapour in the common distilling vessels. If the distilled spirit is found to have brought over any flavour from the subject, it may be advantageously reserved for the same purposes again.

620. It is observable, that though *rectified spirit* is the proper menstruum of the pure volatile oils and of the grosser resinous matter of vegetables, and *water* of the mucilaginous and saline; yet these principles are, in almost all plants, so intimately combined together, that whichever of these liquors is applied at first, it will take up a portion of what is directly soluble only in the other. Hence sundry vegetables, extremely resinous, and whose virtues consist chiefly in their resin, afford nevertheless very useful extracts with water, though not equal to those which may be obtained by a prudent application of spirit. Hence, also, the extracts made from most vegetables by pure spirit are not mere resins; a part of the gummy matter, if the subject contained any such, being taken up along with the resin, an admixture of great advantage to it in a medicinal view. The spirituous extracts of several vegetable substances, as mint-leaves, rhubarb, saffron, dissolve in water as well as in spirit.

621. Pure resins are prepared by mixing with spirituous tinctures of very resinous vegetables a quantity of water. The resin, incapable of remaining dissolved in the watery liquor, separates and falls to the bottom; leaving in the menstruum such other principles of the plant as the spirit might have extracted at first along with it.

622. *Refin of jalap.*

Take any quantity of jalap-root very well bruised; pour upon it so much rectified spirit of wine as will cover it to the height of four fingers, and digest them together in a sand-heat, that the spirit may

extract the virtue of the root. Filter the tincture through paper, put it into a retort, and distil off one half of the spirit. Add to the remainder a proper quantity of water, and the resin will precipitate to the bottom: divide it into little cakes, and dry it with a very gentle heat.

This preparation is a pure resin; such gummy parts as the spirit might have taken up remaining suspended in the liquor. Its indissolubility in any aqueous fluid, and its tenacious quality, by which it adheres to the coats of the intestines, and occasions great irritation and gripes, forbid its being ever given by itself. It is fitted for use, by thoroughly triturating it with starchy powders, by grinding it with almonds or powdered gum, and making the compound into an emulsion with water; or by dissolving it in spirit of wine, and mixing the solution with a proper quantity of syrup or of mucilage. Six or eight grains, managed in either of these ways, prove powerfully cathartic, and generally without griping or greatly disordering the body.

623. *Refin of Peruvian bark.*

This resin is made in the same manner as the foregoing, and proves an elegant preparation of the bark, much stronger in taste than the watery extract, (611.) It is nearly equivalent to about ten times its quantity of the bark in substance. There does not, however, appear to be any advantage in separating the pure resin by the addition of water, either in this or in the other articles. In regard to the bark particularly, it is more advisable to endeavour to unite into one compound all that can be extracted from it by watery and spirituous menstrua: and accordingly the Edinburgh college has received a preparation of this kind, n^o 627.

624. *Extract of saffron.*

Digest saffron in fresh quantities of pure spirit of wine, as long as the spirit extracts any colour from it. Mix the several tinctures together, and distil off the spirit in a tall glass vessel by the heat of a water-bath, till the residuum appears of the consistence of oil or balsam. *Pharm. Bran.*

This is an elegant and high cordial. Boerhaave says it possesses such exhilarating virtues, that if used a little too freely, it occasions an almost perpetual and indecent laughing. He observes, that it tinges the urine of a red colour, and that it mingles with water, spirit, and oils, but is most conveniently taken in a glass of Canary or other rich wine. A few drops are sufficient for a dose.

§ 4. EXTRACTS WITH SPIRIT AND WATER.

625. THERE are sundry vegetables, particularly those of a resinous nature, which are treated, to better advantage, with a mixture of water and spirit, than with either of them singly. The virtues of resinous woods, barks, and roots, may indeed be in great part extracted by long boiling in fresh portions of water; but at the same time they suffer a considerable injury from the continued heat necessary for the extraction, and for the subsequent evaporation of so large a quantity of the fluid. Rectified spirit of wine is not liable to this inconvenience; but the extracts obtained by it, from the substances here intended, being almost purely

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purely resinous, are less adapted to general use than those in which the resin is divided by an admixture of the gummy matter, of which water is the direct menstruum.

There are two ways of obtaining these compound or gummy resinous extracts: one, by using proof-spirit, that is, a mixture of about equal parts of spirit and water, for the menstruum; the other, by digesting the subject first in pure spirit, and then in water, and afterwards uniting into one mass the parts which the two menstrua have separately extracted. In some cases, where a sufficiency of gummy matter is wanting in the subject, it may be artificially supplied, by inspissating the spirituous tincture to the consistence of a balsam, then thoroughly mixing with it a thick solution of any simple gum, as mucilage of gum arabic, and exsiccating the compound with a gentle heat. By this method are obtained elegant gummy resins, extemporaneously miscible with water into milky liquors.

626. *Extract of jalap.*

Upon powdered jalap pour some rectified spirit of wine, and with a gentle heat extract a tincture; boil the remaining jalap in fresh parcels of water. Strain the first tincture, and draw off the spirit, till what remains begins to grow thick; boil the strained decoction also to a like thickness; then mix both the inspissated matters together, and with a gentle fire reduce the whole to a pilular consistence. L.

Take of jalap root, one pound; rectified spirit of wine, four pints; water, two pints. Digest them together for eight days, and strain. Distil off the strained liquor in a retort to one half. Evaporate the remainder in a water-bath, keeping the matter constantly stirring towards the end, so as to make it into a smooth extract. E.

This extract is an useful purgative, preferable to the crude root, as being of more uniform strength, and as the dose, by the rejection of the woody parts, is rendered smaller; the mean dose is twelve grains. If the spirituous tincture was inspissated by itself, it would afford a resinous mass, which, unless thoroughly divided by proper admixtures, occasions violent griping, and yet does not prove sufficiently cathartic; the watery decoctions yield an extract, which operates exceeding weakly: both joined together, as in this preparation, compose an effectual and safe purge. This method of making extracts might be advantageously applied to sundry other resinous substances, as the dry woods, roots, &c. A small quantity of spirit takes up the resin, and much less water than would otherwise be necessary extracts all the other soluble parts.

627. *Extract of Peruvian bark.* E.

The college of Edinburgh has directed the extract of bark to be made with water and spirit in the same manner as the preceding. In the bark we may distinguish two kinds of tastes, an astringent and a bitter one; the former of which seems to reside in the resinous matter, and the latter chiefly in the gummy. The watery extract (n° 611) is moderately strong in point of bitterness, but of the astringency it has only a small

degree. The pure resin, on the other hand, (n° 623.) is strong in astringency, and weak in the bitterness. Both qualities are united in the present extract; which appears to be the best preparation of this kind that can be obtained from this valuable drug.

728. *Extract of logwood.* E.

This extract is directed in the Edinburgh pharmacopœia to be prepared as the foregoing; and the same treatment is judiciously ordered for all the resinous drugs in general.

629. *Cathartic extract.*

Take of socotorine aloes, an ounce and a half; colocynth, six drams; scammony, lesser cardamoms husked, each half an ounce; proof-spirit, one pint. Having cut the colocynth small, and bruised the seeds, pour on them the vinous spirit, and digest with a gentle heat for four days. Press out the tincture, and dissolve therein the aloes and scammony, first separately reduced to powder; then draw off the spirit, and inspissate the remaining mass to a pilular consistence.

This composition answers very effectually the intention expressed in its title, so as to be relied on in cases where the patient's life depends on its taking place; the dose is fifteen grains to half a dram.

530. *Cordial confection.* L.

Take of rosemary tops fresh, juniper-berries, each one pound; lesser cardamom seeds husked, zedoary, saffron, each half a pound. Extract a tincture from these ingredients with about a gallon and a half of proof-spirit: let the tincture be strained off, and reduced by a gentle heat to the weight of about two pounds and a half; then add the following ingredients very finely pulverized, and make the whole into an electuary: Compound powder of crabs-claws, sixteen ounces; cinnamon, nutmegs, each two ounces; cloves, one ounce; double-refined sugar, two pounds.

This confection is composed of the more unexceptionable ingredients of a composition formerly held in great esteem, and which was called, from its author, *Confectio Raleighana*.

The confection is a sufficiently grateful and moderately warm cordial; and frequently given in that intention, from eight or ten grains to a scruple or upwards, in boluses and draughts. The extract retains a considerable share of the flavour and virtue of the ingredients, though not near so much as if a rectified spirit had been employed. The operator should be particularly careful to extract as much from the ingredients as the spirit will take up; otherwise the inspissated matter turns out so thin, and of so little tenacity, that the powders are apt to separate and subside from it in keeping. The crabs-claw powder does not appear to be very necessary; and is inserted rather in compliance with the original, than from its contributing any thing to the intention of the medicine.

SECT. VII. *Empyreumatic Oils.*

631. VEGETABLE and animal substances, and mineral bitumens, on being urged with a red heat, have their original properties destroyed, and are resolved or changed

changed into products of a different nature from what pre-existed in the subject. By burning them in the open air, a part is changed into ashes, a part into foot, and a part is dissolved by the air. Exposed to the fire in close vessels (as in those called *retorts*, having receivers adapted to them for detaining the volatile parts), they are resolved into fetid oils, and different kinds of saline substances which rise into the receiver; and a black coal which remains behind, and which, though no farther alterable in close vessels, on admitting air burns into white ashes. The oils, called from their fetid burnt smell *empyumatic*, are the objects of the present section. Some of these however being obtained in the same process with certain saline bodies of more importance than themselves, are referred to the head of saline preparations.

632. Oil of box. L.

Distil pieces of boxwood in a retort, with a sand-heat gradually increased: the oil will come over along with an acid spirit, which is to be separated by a funnel.

633. Oil of guaiacum.

Put any quantity of chips of guaiacum into an earthen long-neck, or a glass retort, and distil either in a sand-bath or an open fire, increasing the heat by degrees. At first an acid liquor will come over; afterwards a light red oil; and at length, in the utmost degree of fire, a thick black oil which sinks through the other liquors to the bottom of the receiver. Oils may be obtained after the same manner from every kind of wood.

The oils obtained by this treatment from different woods and plants are nearly of the same qualities: they have all a very disagreeable acrid taste, and a burnt stinking smell, without any thing of the peculiar flavour, taste, or virtues, of the subject which afforded them. The present practice rarely employs those oils any otherwise than for external purposes, as the cleansing of foul bones, for the tooth-ach, against some kinds of cutaneous eruptions, old pains and aches, and the like; and for these not very often.

634. Compound oil of balsam of Copaiva. L.

Take two pounds of balsam of Copaiva, and four ounces of gum guaiacum. Distil them in a retort, continuing the operation till a pint of oil is come over.

The mixture, undistilled, proves a medicine of considerable efficacy in rheumatic cases, &c. In distillation the guaiacum gives over little. The balsam distilled in a retort, with or without the gum, yields first a light coloured oil, smelling considerably of the subject; this is immediately followed by a darker coloured oil, and afterwards by a blue one, both which have little other smell than the empyumatic one that distinguishes the oils of this class: their taste is very pungent and acrimonious. This balsam distilled with water yields as much essential oil as above of empyumatic.

635. The anodyne, commonly called Guido's balsam.

Take of tacamahaca in powder, Venice turpentine, each equal parts. Put them into a retort, whereof they may fill two-thirds, and distil with a fire gradually increased. Separate, according to art, the

red oil, or balsam, from the liquor that swims above it.

This oil is supposed to be anodyne and discutient.

636. Dippel's animal-oil.

Take any quantity of the empyumatic oil distilled from animal-substances, as that of hartshorn (the preparation of which is described along with that of the volatile salt and spirit in the following section. Put it into a glass retort; and having fitted on a receiver, distil in a sand-heat: the oil will arise paler coloured and less fetid; and a black coal matter will remain behind. Repeat the distillation in fresh retorts, till the oil ceases to leave any faeces, and till it loses its ill smell, and acquires an agreeable one.

a, The quantity of oil employed in this process should be considerable: for it leaves so much black matter behind in the several distillations, that it is reduced, at last, to a small portion of its original quantity. The distillation must be repeated at least 12 times, and frequently the requisite subtilization will scarcely be obtained with less than 20 distillations. It is said, that the effect may be expedited, by mixing the oil with quicklime into a soft paste; the lime keeping down more of the gross matter, than would remain without such an addition.

b, Animal-oils thus rectified, are thin and limpid, of a subtle, penetrating, not disagreeable smell and taste. They are strongly recommended as anodynes and antispasmodics, in doses of from 15 to 30 drops. Hoffman reports, that they procure a calm and sweet sleep, which continues often for 20 hours, without being followed by any languor or debility, but rather leaving the patient more alert and cheerful than before: that they procure likewise a gentle sweat, without increasing the heat of the blood: that given to 20 drops or more, on an empty stomach, six hours before the accession of an intermittent fever, they frequently remove the disorder: and that they are likewise a very generous remedy in inveterate and chronic epilepsies, and in convulsive motions, especially if given before the usual time of the attack, and preceded by proper evacuations.

c, The empyumatic oils of vegetables, rectified in the same manner by repeated distillations, suffer a like change with the animal; losing their dark colour and offensive smell, and becoming limpid, penetrating, and agreeable: in this state they are supposed, like the animal oils, to be anodyne, antispasmodic, and diaphoretic or sudorific. It is observable, that all the empyumatic oils dissolve in spirit of wine; and that the oftener they are rectified or re-distilled, they dissolve the more readily; a circumstance in which they differ remarkably from essential oils, which, by repeated distillations, become more and more difficult of solution.

d, How far these preparations really possess the virtues that have been ascribed to them, has not yet been sufficiently determined by experience; and the tediousness and trouble of the rectification having prevented their coming into general use, or being often made. They are liable also to a more material inconvenience in regard to their medicinal use, precariousness in their quality: for how perfectly soever they be rectified, they

they generally lose, in keeping, the qualities they had received from that process, and return more and more towards their original fetidness.

SECT. VIII. *Salts and Saline Preparations.*

§ I. FIXED ALKALINE SALTS.

637. THE ashes of most vegetables, steeped or boiled in water, give out to it a saline substance, separable in a solid form by evaporating the water. This kind of salt never pre-exists in the vegetable, but is always generated during the burning. It is called *fixed alkaline salt*.

638. *Salt of tartar.*

Let any kind of tartar be wrapped up in strong brown paper, first made wet, or included in a proper vessel, and exposed to the fire, that its oil may be burnt out: then boil it in water, filter the solution, and evaporate it, till there remains a dry salt, which is to be kept in a vessel closely stopp'd. *L.*

Take of tartar any quantity, and having wrapped it up in brown paper, or put it into a crucible, let it be surrounded with a gentle fire, till reduced to a coal. Having reduced this to powder, calcine it again in an open crucible, with a fire not sufficient to melt it till the salt becomes white, or at least ash-coloured. Dissolve it in water, and strain thro' a linen cloth; after which it is to be evaporated in a clean iron vessel, till all the moisture is exhale. Continue to keep it over the fire, till the bottom of the vessel is almost red. Then put it up in glass bottles well stopp'd. *E.*

This salt has a pungent fiery taste; and occasions in the mouth a kind of urinous flavour, probably from the resolution which it produces in the saliva. It readily dissolves in water, and deliquesces in the air; but is not acted upon by pure vinous spirits. Instead of being dissolved by vinous spirits, if a saturated solution of it in water be dropt into the pure spirit, it will not mix therewith, but fall distinct to the bottom: if water be mixed with the spirit, the addition of fixed alkaline salt will imbibe the water, and form with it, as in the other case, a distinct fluid at the bottom; this property affords a commodious method of dephlegmating vinous spirits, or separating their watery part, as we have already seen.

639. Salt of tartar, or solutions of it in water, raise an effervescence on the admixture of acid liquors, and destroy their acidity, the alkali and acid uniting together into a compound of new qualities called *neutral*: earthy substances, and most metallic bodies, previously dissolved in the acid, are precipitated from it by the alkali. The alkaline salt changes the colours of the blue flowers of plants, or their infusions, to a green: it has the same effect on the bright red flowers, and on the colourless infusions of white ones; but in many of the dark red, as those of the wild poppy, and of the yellow ones, it produces no such change.

640. Solutions of this salt liquefy all the animal juices, except milk; corrode the fleshy parts into a kind of mucous matter; concrete with animal fats, and vegetable oils, into soap; and dissolve sulphur into a red liquor; especially if assisted by a boiling heat, and mingled with quicklime, which greatly promotes their

activity. On pure earths and stones, these liquors have no sensible action; but if the earth or stones be mixed with four or five times the weight of the dry salt, and urged with a strong fire, they melt along with it, and become afterwards perfectly soluble both in water and by the moisture of the air: with a smaller proportion of the salt, as an equal weight, they run into an indissoluble glassy matter.

641. The medical virtues of this salt are, to attenuate the juices, resolve obstructions, and promote the natural secretions. A dilute solution of it, drank warm in bed, generally excites sweat: if that evacuation is not favoured, its sensible operation is by urine. It is an excellent remedy in colic habits, especially if a few grains of aloes be occasionally interposed; with this advantage above other purgatives and laxatives, that when the complaint is once removed, it is not apt to return. Where acidities abound in the first passages, this salt absorbs the acid, and unites with it into a mild aperient neutral salt. As one of its principal operations is to render the animal fluids more thin, it is obvious, that where they are already colliquated, as in scurvy, and in all putrid disorders in general, this medicine is improper. The common dose of the salt is from two or three grains to a scruple; in some circumstances it has been extended to a dram, in which case it must always be largely diluted with watery liquors.

642. *Salt of wormwood.*

Let ashes of wormwood (which the shops are usually supplied with from the country) be put into an iron pot, or any other convenient vessel; and kept red-hot over the fire for some hours, often stirring them, that what oily matter remains may be burnt out; then boil the ashes in water, filter the ley through paper, and evaporate it till a dry salt remains; which is to be kept in a vessel close stopp'd. *L.* After the same manner a fixed alkaline still may be prepared from all those vegetables which yield this kind of salt, *L.* as bean-stalks, broom, &c. *E.*

These salts are obtained to greater advantage from dry plants than from green ones; they must not, however, be too dry, or too old; for in such case, they afford but a small quantity of salt. The fire should be so managed, as that the subject may burn freely, yet not burst into violent flame; this last circumstance would greatly lessen the yield of the salt; and a very close smothering heat would have this effect in a greater degree: hence the ashes of charcoal scarce yield any salt, whilst the wood it was made from, if burnt at first in the open air, affords a large quantity.

Tachenius, Boerhaave, and others, have entertained a very high opinion of these oily salts, and endeavour as much as possible to retain the oil in them. They are nevertheless liable to a great inconvenience, uncertainty in point of strength, without promising any advantage to counterbalance it; if the common alkalis are required to be made milder and less acrimonious (which is the only point aimed at in the making of these medicated salts as they are called), they may be occasionally rendered so by suitable additions. Pure alkalis, united with a certain quantity of expressed oil, compose (as we shall see hereafter) a perfect

fect soap, in which the pungent taste of the alkaline salt is totally suppressed: it is obvious, therefore, that on the same principle the pungency may be covered in part, and this proportionably to the quantity of oily matter combined.

643. *Fixed nitre.*

Take of powdered nitre, four ounces; charcoal in powder, five drams. Mix them thoroughly together, by rubbing them in a mortar, and inject the mixture, by a little at a time, into a red-hot crucible. A deflagration, or a bright flame with a hissing noise, happens on each injection; the whole quantity being thus deflagrated, continue the fire strong for half an hour.

Nitre is composed of the common vegetable fixed alkaline salt, and a peculiar acid. In this process, the acid is destroyed, or changed to another nature; and the remaining salt proves merely alkaline, not different in quality from the salt of tartar, except that a very minute portion of the nitre generally remains unchanged; the salt is purified by solution in water, filtration, and evaporation.

644. *The alkaline salt of sea-salt.*

Take of cubical nitre (prepared as hereafter described in § 6.) four ounces; charcoal, five drams. Mix and deflagrate as in the preceding process.

a, Cubical nitre is composed of the nitrous acid united with the alkaline basis of sea-salt: the acid being here separated in the deflagration, that alkali remains nearly pure. It possesses the general properties of the foregoing preparation; changing blue flowers, green; dissolving oils, salts, and sulphur; bringing earths and stones into fusion, and forming with them, according to its quantity, either a vitreous, or a soluble compound; effervescing with acids, precipitating earths, and metals dissolved in them, and uniting with the acid into a neutral salt. It differs from the foregoing alkalies, in being much milder in taste; not so readily dissolving in water; not at all deliquating in the air; easily assuming, like neutral salts, a crystalline form; and yielding, with each of the common acids, compounds very sensibly different, both in their form and qualities, from those which result from the coalition of the vegetable alkalies with the respective acids. The crystals of this salt itself are prismatic, greatly resembling those of the salt called *sal mirabile*; (see § 6.) Exposed to a warm air, they fall into a porous, friable mass, and lose above two-thirds of their weight.

b, How far this salt differs in medical virtue from the other alkalies, is not well known. It apparently possesses the same general virtues; and, as it is far milder, may be given in more considerable doses.

c. A salt of the same nature with this, but less pure, as containing an admixture of the common vegetable alkali, is prepared at Alicante, and some other places, from the ashes of certain marine plants, called *kali*; which plants are supposed to have given rise to the name *alkali*. The salt of the kali plants is called *soda*, or *bariglia*: it has been long used medicinally in France, and begins now to be introduced into practice in this country; but the above pure alkali extracted from sea-salt is doubtless preferable to it.

645. *Ley of tartar, or oil of tartar per deliquium.*
Put any quantity of salt of tartar in a flat glass dish, and expose it to the air, for some days, in a moist place: it will run into a liquor, which is either to be filtered through paper, or separated from the feces by decantation. The higher the salt has been calcined, the more readily will it relent in the air.

The solutions of fixed alkaline salts, effected by exposing them to a moist air, are generally looked upon as being purer than those made by applying water directly: for though the salt be repeatedly dissolved in water, filtered, and exsiccated; yet, on being liquesfied by the humidity of the air, it will still deposit a portion of earthy matter: but it must be observed, that the exsiccated salt leaves always an earthy matter on being dissolved in water, as well as on being deliquated in the air. The deliquated lixivium is said to contain nearly one part of alkaline salt to three of an aqueous fluid. It is indifferent, in regard to the lixivium itself, whether the white ashes of tartar, or the salt extracted from them, be used: but as the ashes leave a much greater quantity of earth, the separation of the ley proves more troublesome.

646. *Purified potash. E.*

Take of the lixivial salt, commonly called *pearl-ashes*, any quantity; and let it be made red-hot in a crucible, that the oily matter, if any is contained in it, may be burnt out. Then powder and mix it with an equal quantity of water; let the liquor settle, and pour it off from the feces. Evaporate to dryness in an iron vessel. The salt is known to be perfectly purified, when it totally dissolves in an equal weight of water into a liquor without smell or taste.

647. *Soap leys.*

Take of Russia potash, quicklime, of each equal weights. Gradually sprinkle on them as much water as will slake the lime; then pour on more water, stirring the whole together, that the salt may be dissolved: let the ley settle, pour it off into another vessel, and, if there is occasion, filter it. A wine pint of this ley, measured with the greatest exactness, ought to weigh just 16 ounces Troy. If it proves heavier, for every dram that it exceeds this weight, add to each pint of the liquor an ounce and a half of water by measure: if lighter, boil it till the like quantity is wasted, or pour it upon fresh lime and ashes. L.

Take of quicklime, eight ounces; purified potash, six ounces. Put the lime into a glazed earthen or iron vessel, with 28 ounces of warm water. Add the potash as soon as the lime is slaked; and having mixed them well together, let the vessel be covered till it cools. When the mixture has become cold, pour the whole into a glass funnel, having the pipe stopped with a clean linen rag. Cover the upper part of the funnel, and insert its pipe into another glass vessel, that the ley may drop from it. When it has ceased to drop, pour some ounces of water cautiously into the funnel, that it may lie above the thick matter. The ley will again begin to drop: and this operation is to be repeated till 32 ounces by measure, or 36 by weight,

weight, have passed through; which will take up the space of two or three days. Then mix the upper and under parts of the ley together by shaking the vessel, and keep it in a glass bottle well stoppered. *E.*

Quicklime greatly increases the strength of alkaline salts; and hence this ley is much more acrimonious, and acts more powerfully as a menstruum on oils, fats, &c. than a solution of the potash alone; the lime should be used fresh from the kiln; by long keeping, even in close vessels, it loses of its strength; such should be made choice of as is thoroughly burnt or calcined, which may be known by its comparative lightness.

All the instruments employed in this process should be either of wood, earthen ware, or glass: the common metallic ones would be corroded by the ley, so as either to discolour, or communicate disagreeable qualities to it. If it should be needful to filter or strain the liquor, care must be taken that the filter or strainer be of vegetable matter; woollen, silk, and that sort of filtering paper which is made of animal substances, are quickly corroded and dissolved by it.

The liquor is most conveniently weighed in a narrow-necked glass bottle, of such a size, that the measure of a wine-pint may arise some height into its neck; the place where it reaches to, being marked with a diamond. A pint of the common leys of our soft-soap makers weighs more than 16 ounces; it has been found that their soap-ley will be reduced to the standard here proposed, by mixing it with something less than an equal measure of water.

648. *The septic stone, or potential cautery. E.*

Take any quantity of soap-ley; evaporate it over a gentle fire in a very clean iron vessel, till the ebullition ceases, and the matter flows smooth like oil, which will happen before it is red-hot. Then pour it out on a clean iron plate, and cut it into slips before it grows cold; then keep it in a glass well stoppered.

This preparation is a strong and a sudden caustic. It has an inconvenience of being apt to liquefy too much upon the part to which it is applied, so that it is not easily confined within the limits in which it is intended to operate: and indeed the suddenness of its action depends on this disposition to liquefy.

649. a. *The stronger common caustic. L.*

Boil any quantity of the soap-leys above described, to one-fourth part: then, whilst it continues boiling, some lime, that has been kept for several months in a glass vessel stoppered with a cork, is to be sprinkled in by little and little, till it has absorbed all the liquor, so as to form a kind of paste; which keep for use in a vessel very closely stoppered.

Here the addition of lime in substance renders the preparation less apt to liquefy than the foregoing, and consequently more easily confineable within the intended limits, but proportionably slower in its operation. The design of keeping the lime is, that its acrimony may be somewhat abated.

649. b. *The milder common caustic. L.*

Take of fresh quicklime, soft soap, of each equal parts.

Mix them well together at the time of using.

This caustic, notwithstanding the lime is used fresh, proves much milder than the former; the acrimony of the salt being here covered by the oil and tallow by which it is reduced into soap. The mild caustic of the Edinburgh pharmacopœia is only soap-ley made into a paste with quicklime.

§ 2. VOLATILE ALKALINE SALTS.

650. As fixed alkalies are produced in the burning of vegetables, and remain behind in the ashes; volatile ones are produced by a like degree of heat from animal substances, and rise in distillation along with the other volatile principles; the admission of air, necessary for the production of the former, is not needful for the latter. These salts are obtainable also from some vegetable matters; and from vegetable and animal foot. Though a strong fire is requisite for their production, yet when once completely formed, they are dissipated by the gentlest warmth: in distillation, they rise sooner than the most highly rectified spirit of wine. They are produced in urine, by putrefaction, without fire; and without fire also they exhale from it.

651. *Spirit, salt, and oil of hartshorn. L.*

Distil pieces of hartshorn by a fire gradually raised almost to the highest: a spirit, salt, and oil, will ascend.

If the oil be separated, and the spirit and salt distilled again together with a very gentle heat, they will both arise more pure. If this be carefully repeated several times, the salt will become exceedingly white, the spirit limpid as water, and of a grateful odour.

The salt, separated from the spirit, and sublimed first from an equal weight of pure chalk, and afterwards from a little rectified spirit of wine, becomes the sooner pure.

Calcined hartshorn is generally made by burning the horns left after this distillation.

After the same manner; a spirit, salt, and oil, may be obtained from every kind of animal substance.

652. In the former edition of the Edinburgh dispensatory the following directions were given.

Put pieces of hartshorn into a large iron pot furnished with an earthen head; and having fitted on a capacious receiver, and luted the junctures, distil in an open fire gradually increased. At first a phlegm arises, then a spirit, and afterwards a volatile salt, accompanied with an oil: the oil that comes over first is of a yellowish colour, but on protracting the distillation, there succeeds a reddish one verging to black. In the bottom of the iron pot there remains a black coal, which being burnt to whiteness in the open air, is called *calcined hartshorn*.

Having poured out of the recipient all the different matters which have come over into it, they may be separated from one another in the following manner; the oil separates from the phlegm and spirit in filtration: the latter two will pass through, and the oil remain on the filter.

The phlegm may be separated from the spirit by distilla-

distillation in a tall vessel, with a gentle heat; the spirit will come over into the recipient, and the phlegm remain at the bottom of the distilling vessel.

The spirit may be divided into a volatile salt and phlegm, by distilling it in a very tall and narrow cucurbit; the salt will arise, and adhere to the head in a dry form; the phlegm remaining behind.

The salt may be freed from the oil, by subliming it from twice its quantity of potash; for the oil is kept down by the potash, whilst the salt arises.

The spirit also is rendered purer, by adding, to every pint, two ounces of potash, and distilling in a glass retort.

The remaining potash may be again purified for use, by calcining it in an open fire, so as to burn out the oil it had absorbed from the salt or spirit.

A spirit, salt, and oil, may be obtained in the same manner from all the solid parts of animals.

653. The wholesale dealers have very large pots for the distillation of hartshorn, with earthen heads almost like those of the common still: for receivers, they use a couple of oil-jars, the mouths of which are luted together; the pipe that comes from the head enters the lowermost jar, through a hole made on purpose in its bottom. When a large quantity of the subject is to be distilled, it is customary to continue the operation for several days successively; only unluting the head occasionally to put in fresh materials.

When only a small quantity of spirit or salt is wanted, a common iron pot, such as is usually fixed in sand furnaces, may be employed, an iron head being fitted to it. The receiver ought to be large, and a glass, or rather tin adpater, inserted betwixt it and the pipe of the head.

The distilling vessel being charged with pieces of the horn, a moderate fire is applied, which is slowly increased, and raised at length almost to the utmost degree. At first a phlegmatic liquor arises; the quantity of which will be less or greater according as the horns were more or less dry: this is succeeded by the salt and oil; the salt at first dissolves as it comes over in the phlegm, and thus forms what is called *spirit*: when the phlegm is saturated, the remainder of the salt concretes in a solid form to the sides of the recipient. If it is required to have the whole of the salt solid and undissolved, the phlegm should be removed as soon as the salt begins to arise, which may be known by the appearance of white fumes; and that this may be done the more commodiously, the receiver should be left unluted till this first part of the process is finished. The white vapours which now arise sometimes come with such vehemence as to throw off or burst the receiver: to prevent this accident, it is convenient to have a small hole in the luting, which may be occasionally stopped with a wooden peg, or opened as the operator shall find proper. After the salt has all arisen, a thick dark-coloured oil comes over: the process is now to be discontinued, and the vessels, when grown cold, unluted.

All the liquid matters being poured out of the receiver, the salt which remains adhering to its sides is to be washed out with a little water, and added to the rest. It is convenient to let the whole stand for a few hours, that the oil may the better disengage itself from the liquor, so as to be first separated by a fun-

nel, and afterwards more perfectly by filtration thro' wetted paper. The salt and spirits are then to be farther purified as above directed.

654. The spirit of hartshorn met with in the shops is extremely precarious in point of strength; the quantity of salt contained in it (on which its efficacy depends) varying according as the distillation in rectifying it is continued for a longer or shorter time. If after the volatile salt has arisen, so much of the phlegm or watery part be driven over after it as is just sufficient to dissolve it, the spirit will be fully saturated, and as strong as it can be made: if the process is not at this instant stopped, the phlegm continuing to arise must render the spirit continually weaker and weaker. The distillation therefore ought to be discontinued at this period, or rather whilst some of the salt still remains undissolved: the spirit will thus prove always equal, and the buyer be furnished with a certain criterion of its strength. Very few have taken any notice of the above-mentioned inconvenience of these kinds of spirits; and the remedy is first hinted at in the *pharmacopœia reformata*. The purity of the spirits is easily judged from its cleanness and grateful odour.

655. Volatile alkaline salts, and their solutions called *spirits*, agree in many respects with fixed alkalies and their solutions or leys; as in changing the colour of blue flowers to a green; effervescing with and neutralizing acids; liquefying the animal juices, and corroding the fleshy parts, so as, when applied to the skin, and prevented from exhaling by a proper covering, to act as caustics; dissolving oils and sulphur, though less readily than the fixed alkalies, on account probably of their not being able to bear any considerable heat, by which their activity might be promoted. Their principal difference from the other alkalies seems to consist in their volatility: they exhale or emit pungent vapours in the coldest state of the atmosphere; and by their stimulating smell, they prove serviceable in languors and faintings. Taken internally, they discover a greater colliquating as well as stimulating power; the blood drawn from a vein, after their use has been continued for some time, being found to be remarkably more fluid than before: they are likewise more disposed to operate by perspiration, and to act on the nervous system. They are particularly useful in lethargic cases; in hysterical and hypochondriacal disorders, and in the languors, headaches, inflations of the stomach, flatulent colics, and other symptoms which attend them: they are generally found more serviceable to aged persons, and in phlegmatic habits, than in the opposite circumstances. In some fevers, particularly those of the low kind, accompanied with a cough, hoarseness, redundancy of phlegm, and sicciness of the blood, they are of great utility; liquefying the viscid juices, raising the *vis-vita*, and exciting a salutary diaphoresis; but in putrid fevers, scorvies, and wherever the mass of blood is thin and acrimonious, they do harm. As they are more powerful than the fixed in liquefying sisy blood and tenacious humours, so they prove more hurtful where the fluids are already in a colligated state. In vernal intermittents, particularly those of the slow kind, and where the blood is dense or sisy, they are often the most efficacious remedy. Mr Bisset observes, in his Essay

on the medical constitution of Great Britain, that tho' many cases occur which will yield to no other medicine than the bark, yet he has met with a pretty many that were only suppressed from time to time by the bark, but were completely cured by alkaline spirits: that these spirits will often carry off vernal intermittents without any previous evacuation; but that they are generally more effectual if a purge is premised: and in plethoric or inflammatory cases, or where the fever perforates a remittent, venesection.

These salts are most commodiously taken in a liquid form, largely diluted; or in that of a bolus, which should be made up only as it is wanted. The dose is from a grain or two to ten or twelve. Ten drops of a well made spirit, or saturated solution, are reckoned to contain about a grain of the salt. In intermittents, fifteen or twenty drops of the spirit are given in a tea-cup full of cold spring-water, and repeated five or six times in each intermission.

656. The volatile salts and spirits prepared from different animal substances, have been supposed capable of producing different effects upon the human body, and to receive specific virtues from the subject. The salt of vipers has been esteemed particularly serviceable in the disorders occasioned by the bite of that animal; and a salt drawn from the human skull, in diseases of the head. But modern practice acknowledges no such different effects from these preparations, and chemical experiments have shewn their identity. There is indeed, when not sufficiently purified, a very perceptible difference in the smell, taste, degree of pungency, and volatility of these salts; and in this state their medicinal virtues vary considerably enough to deserve notice; but this difference they have in common, according as they are more or less loaded with oil, not as they are produced from this or that animal substance. As first distilled, they may be looked upon as a kind of volatile soap, in which the oil is the prevailing principle; in this state they have much less of the proper alkaline acrimony and pungency than when they have undergone repeated distillations, and such other operations as disengage the oil from the salt; for by these means they lose their saponaceous quality, and, acquiring greater degrees of acrimony, become medicines of a different class. These preparations, therefore, do not differ near so much from one another as they do from themselves in different states of purity. To which may be added, that when we consider them as loaded with oil, the virtues of a distilled animal-oil itself are likewise to be brought into the account.

These oils, as first distilled, are highly fetid and offensive, of an extremely heating quality, and of such activity, that, according to Hoffman's account, half a drop, dissolved in a dram of spirit of wine, is sufficient to raise a copious sweat. By repeated rectifications, they lose their offensiveness, and at the same time become mild in their medicinal operation: the rectified oils may be given to the quantity of twenty or thirty drops, and are said to be anodyne and antispasmodic, to procure a calm sleep and gentle sweat, without heating or agitating the body. It is obvious, therefore, that the salts and spirits must differ, not only according to the quantity of oil they contain, but according to the quality of the oil itself

in its different states.

The volatile salts and spirits, as first distilled, are of a brown colour, and a very offensive smell: by repeated rectification, as directed in the processes above set down, they lose great part of the oil on which these qualities depend, the salt becomes white, the spirit limpid as water, and of a grateful odour; and this is the mark of sufficient rectification.

It has been objected to the repeated rectification of these preparations, that by separating the oil, it renders them similar to the pure salt and spirit of sal ammoniac, which are procurable at an easier rate. But this is by no means the case. The intention is not to purify them wholly from the oil, but to separate the grosser part, and to subtilize the rest, so as to bring it towards the same state as when the oil is rectified by itself. Dr Lewis has repeated the rectification of spirit of hartshorn twenty times successively, and found it still to participate of oil, but of an oil very different from what it was in the first distillation.

The rectified oils, in long keeping, become again fetid. The salts and spirits also, however carefully rectified, suffer, in length of time, the same change; resuming their original brown colour and ill smell; a proof that the rectification is far from having divested them of oil.

657. Spirit, salt, and oil of foot. L.

Distil foot after the same manner as directed above for hartshorn: but here more labour is required to render the spirit and salt pure.

The volatile salt and spirit of foot are, when sufficiently purified, not different in quality from those of animal substances; though some have preferred them in nervous complaints, particularly in epileptic cases.

658. The volatile salt and spirit of sal ammoniac.

Take a pound and a half of any fixed alkaline salt, a pound of sal ammoniac, and four pints of water. Distil off, with a gentle heat, two pints of spirit. The volatile salt is made from a pound of sal ammoniac mixed with two pounds of pure chalk, and set to sublime in a retort with a strong fire. L. Take sal ammoniac, and purified potashes, each one pound; water, a pint and an half; distil to dryness. E.

The volatile salt and spirit of sal ammoniac are the purest of all the medicines of this kind. They are somewhat more acrimonious than those produced directly from animal-substances, which always contain a portion of the oil of the subject, and receive from thence some degree of a saponaceous quality. These salt may be reduced to the same degree of purity, by combining them with acids into ammoniacal salts; and afterwards recovering the volatile alkali from these compounds by the processes above directed.

659. The matter which remains in the retort, after the distillation of the spirit, and sublimation of the salt of sal ammoniac, is found to consist of marine acid united with the fixed alkali or chalk employed. When fixed alkaline salt has been used as the intermediate, the residuum, or *caput mortuum*, as it is called, yields, on solution and crystallization, a salt exactly similar to the *coagulated spirit of sea salt* hereafter described. And hence we may judge of the ex-
traor-

Extraordinary virtues formerly attributed to this salt, under the names of *sal antihystericum*, *antihypocondriacum*, *febrifugum*, *digestivum sylvii*, &c.

660. The caput mortuum of the volatile salt, where chalk is employed as an intermedium, exposed to a moist air, runs into a pungent liquor, which proves nearly the same with a solution of chalk made directly in the marine acid: it is called by some *oleum cretae*, "oil of chalk." If calcined shells, or other animal-limes, be mingled with sal ammoniac, a mafs will be obtained, which likewise runs in the air, and forms a liquor of the same kind. This liquor seems to be the secret of some pretenders to a dissolvent of the calculus.

661. Volatile caustic spirit.

Take of sal ammoniac, one pound; quicklime, a pound and a half; water, four pints. Quench the lime in the water; and having put this mixture into a retort, add to it the powdered salt. Immediately adapt a recipient, and with a very gentle heat draw off two pints.—The Edinburgh college order a pound of quicklime, with only eight ounces of sal ammoniac, and as much water. The lime is slaked with the water; then ground with the salt, and distilled.

This spirit is commonly called, from the intermedium, *spirit of sal ammoniac with quicklime*. The effect of the quicklime on the sal ammoniac, is very different from that of the chalk and fixed alkali in the foregoing process. Immediately on mixture, a very penetrating vapour exhales; and in distillation, the whole of the volatile salt arises in a liquid form; no part of it appearing in a concrete state, how gently soever the liquor be redistilled. This spirit is far more pungent than the other both in smell and taste; and, like fixed alkalies rendered caustic by the same intermedium, it raises no effervescence on the admixture of acids.

This spirit is held too acrimonious for internal use, and has therefore been chiefly employed for smelling to in faintings, &c. though, when properly diluted, it may be given inwardly with safety. It is an excellent menstruum for some vegetable substances, as Peruvian bark, which the other spirit extracts little from.

§ 3. COMBINATION OF ALKALIES WITH OILS AND INFLAMMABLE SPIRITS.

662. Almond soap. L.

TAKE any quantity of fresh-drawn oil of almonds, and thrice its quantity by measure of the foregoing soap leys. Digest them together in such a heat, that they may but just boil or simmer, and in a few hours they will unite: after which, the liquor in boiling, will soon become ropy, and in good measure transparent; a little of it suffered to cool, will appear like jelly. When this happens, throw in by little and little some common salt, till the boiling liquor loses it rosinels; and continue the coction, till, on receiving some drops on a tile, the soap is found to coagulate, and the water freely separates from it. The fire being then removed, the soap will gradually arise to the surface of the liquor; take it off before it grow cold, and put it into a wooden mould or frame, which has a cloth for its bottom:

afterwards take out the soap, and set it by till sufficiently dried. After the same manner, a soap may likewise be made with oil-olive; but the purest oil must be used, that the soap may be as little ungrateful as possible either to the palate or stomach.

This process is so fully described, as to render any further directions unnecessary. The general virtues of soap have been already mentioned in the *Table of MATERIA MEDICA*; that prepared after this manner is not different in quality from the hard sort there mentioned.

663. Purified soap.

Slice one pound of dry, hard, Genoa, Alicante, or any other oil-soap, into a clean pewter vessel, and pour upon it two gallons of rectified spirit of wine. Place the vessel in a water-bath, and apply such a degree of heat as may make the spirit boil, when it will soon dissolve the soap. Let the vessel stand close covered in a warm place, till the liquor has grown perfectly clear; if any oily matter swim upon the surface, carefully scum it off. Then decant the limpid liquor from the faeces, and distil off from it all the spirit that will arise in the heat of a water-bath. Expose the remainder to a dry air for a few days, and it will become a white, opaque, and somewhat friable mafs.

Soap thus purified has little or no smell; and proves, upon examination, not in any degree acrimonious, but quite mild and soft, and consequently well fitted for medicinal purposes.

664, a. Saponaceous lotion. L.

Take of rose-water, three quarters of a pint; oil-olive, one quarter of a pint; ley of tartar, half an ounce by measure. Grind the ley of tartar and the oil together, until they unite; then gradually add the rose water.

This is designed for external use, as a detergent wash; and, like other soapy liquors, answers this purpose very effectually. Where it is required to be more deterfivè, it may be occasionally rendered so by the addition of a small quantity of a solution of any fixed alkaline salt.

664, b. Saponaceous liniment. L.

Take of spirit of rosemary, one pint; hard Spanish soap, three ounces; camphor, one ounce. Digest the soap in the spirit of rosemary, until it is dissolved; then add the camphor.

This composition also is employed chiefly for external purposes, against rheumatic pains, sprains, bruises, and other like complaints. Soap acts to much better advantage, when thus applied in a liquid form, than in the solid one of a plaster.

665. Anodyne balsam, commonly called Bates's balsam. E.

Take of white soap, five ounces; crude opium, an ounce; camphor, two ounces; essential oil of rosemary, half an ounce; rectified spirit of wine, two pints. Digest the spirit with the soap and opium, in a gentle sand-heat, for three days; then strain the liquor, and add to it the camphor and essential oil.

This composition is greatly commended for allaying pains, and it is said to have been sometimes used with benefit even in the gout; a cloth dipt in it being laid on the part. It is sometimes likewise directed to be taken inwardly in the same disorder, as also in nervous colics, jaundice, &c. from twenty to fifty drops or more; though surely, in gouty cases, the use of opiate medicines requires great caution. One grain of opium is contained in about ninety drops of the balsam.

666. *Saponaceous balsam, commonly called opodeldoc.*

This is exactly the same with the foregoing; omitting only the opium. *E.*

667. *Dulcified spirit of sal ammoniac. L.*

Take half a pound of any fixed alkaline salt, four ounces of sal ammoniac, and three pints of proof-spirit of wine. Distil off, with a gentle heat, a pint and a half.

This spirit has lately come much into esteem, both as a medicine and a menstruum. It is a solution of volatile salt in rectified spirit of wine; for though proof-spirit is made use of, its phlegmatic parts does not arise in the distillation, and serves only to facilitate the action of the pure spirit upon the ammoniacal salt. Rectified spirit of wine does not dissolve volatile alkaline salts by simple mixture: on the contrary, it precipitates them, as has been already observed, when they are previously dissolved in water; but by the present process, a considerable proportion of the volatile alkali is combined with the spirit. It might perhaps, for some purposes, be more advisable, to use in this intention the volatile spirit made with quicklime; for this may be mixed at once with the rectified spirit of wine, in any proportions, without the least danger of any separation of the volatile alkali: And accordingly the Edinburgh college have now ordered this spirit to be made by mixing four ounces caustic spirit of sal ammoniac with eight of spirit of wine.

668. *The volatile fetid spirit. L.*

Take of any fixed alkaline salt, a pound and a half; sal ammoniac, one pound; asafetida, four ounces; proof-spirit of wine, six pints. Draw off with a gentle heat, five pints.

669. *Fetid volatile spirit. E.*

Take of vinous spirit of sal ammoniac, eight ounces; asafetida, half an ounce. Digest 12 hours in a close vessel; then distil eight ounces in a water-bath.

This spirit is designed as an antihysteric, and is undoubtedly a very elegant one.

670. *Volatile aromatic spirit. L.*

Take of essential oil of nutmegs, essence of lemons, each two drams; essential oil of cloves, half a dram; dulcified spirit of sal ammoniac, one quart. Distil them with a very gentle fire.

671. *Volatile oily spirit, commonly called saline aromatic spirit. E.*

Take of vinous spirit of sal ammoniac, eight ounces; essential oil of rosemary, one dram and a half; essence of lemon-peel, a dram. Mix the whole together. Draw off by distillation, in the heat of a water-bath, near one gallon.

Volatile salts thus united with aromatics, are not only more agreeable in flavour, but likewise more acceptable to the stomach, and less acrimonious, than in their pure state. Both the foregoing compositions turn out excellent ones, provided the oils are good, and the distillation skillfully performed. The dose is from five or six drops to sixty or more.

§. 4. ACID SPIRITS.

672. *Weak spirit and the strong spirit (or oil,) of vitriol, and colcothar. L.*

Let calcined vitriol be distilled in earthen vessels, with reverberatory fire, for three days without intermission. What remains in the vessels is called *colcothar* of vitriol. Put the distilled liquor into a glass retort, and place it in a sand furnace: the weak spirit will come over, the strong (improperly called *oil* of vitriol) remaining behind.

This process, was never practicable to advantage without a very large apparatus, and is now entirely superceded by the much cheaper method of preparing the acid from sulphur.

The acid spirit, as it arises in the first distillation, appears of a dark or blackish colour, and contains a considerable portion of phlegm. In the second distillation, the phlegmatic parts arise first, together with the lighter acid, which are kept apart under the name of *weak spirit*: at the same time, the remaining strong spirit, or *oil* as it is called, loses its black colour, and becomes clear; and this is the usual mark for discontinuing the distillation.

673. The spirit of vitriol is the most ponderous of all the liquids we are acquainted with; and the most powerful of the acids. If any other acid be united with a fixed alkaline salt or earth; upon the addition of the vitriolic, such acid will be dislodged, and arise on applying a moderate heat, leaving the vitriolic in possession of the alkali; though without this addition it would not yield to the most vehement fire. In medicine it is employed chiefly as subservient to other preparations: it is likewise not unfrequently mixed with juleps and the like, in such quantity as will be sufficient to give the liquor an agreeable tartness in the intentions of a cooling antiseptic, restraining, and stomachic.

674. *Sulphurated water, commonly called gas sulphuris. L.*

Take a quart of water, and half a pound of sulphur. Let part of the sulphur be set on fire in an iron ladle, and suspended over the water in a close vessel: as soon as the fumes subside, some more of the sulphur is to be fired in the same manner; and this repeated till the whole quantity is burnt.

This preparation is said to give relief in fits of the convulsive asthma. It is taken to the quantity of a spoonful or half an ounce, two or three times a day, in any suitable vehicle.

675. *Glauber's spirit of nitre.*

Take three pounds of nitre, and one pound of the strong spirit or oil of vitriol. Mix them cautiously and gradually together under a chimney; and then distil at first with a gentle, and afterwards with a stronger heat. *L.*

Put two pounds of nitre into a glass retort; and add
by

by degrees one pound of oil of vitriol diluted with an equal quantity of warm water. Distil in a sand-heat, gradually increased, till the matter remains dry.—This spirit is rectified by a second distillation with the heat of a water-bath, in a glass cucurbit, with its head and receiver; the phlegm arises, leaving the spirit behind. *E.*

The acid of nitre is next in strength to the vitriolic, and dissolves all but that from alkaline salts or earths. It differs from all the other acids in desagrating with inflammable matters: if a solution of any inflammable substance, as hartshorn, &c. in this acid be set to evaporate; as soon as the matter approaches to dryness, a violent detonation ensues. The chief use of this acid is as a menstruum for certain minerals, and as the basis of some particular preparations, of which hereafter. It has been given likewise diluted, with any convenient vehicle, as a diuretic, from 10 to 50 drops.

676. *Glauber's spirit of sea-salt.*

Two pounds of sea-salt, and the same quantity of strong spirit or oil of vitriol. Dilute the acid spirit with a pint of water, and pour this mixture, by little and little, on the salt under a chimney; then distil, at first with a gentle, and afterwards with a stronger fire. *L.*

The spirit of sea-salt is the weakest of the mineral acids, but stronger than any of the vegetable; it requires a greater fire to distil it than that of nitre, yet is more readily dissipated by the action of the air. It is used chiefly as a menstruum for the making of other preparations; sometimes likewise it is given, properly diluted, as an antiphlogistic, aperient, and diuretic, from 10 to 60 or 70 drops.

677. *Aqua fortis. L.*

Take of nitre, green vitriol uncalcined, each three pounds; the same vitriol calcined, one pound and a half. Mix them well together, and distil with a very strong fire, as long as any red vapour arises. *L.*

Here the direction of thoroughly mixing the ingredients ought to be well attended to, for if this is neglected, or but slightly performed, the due quantity of acid will not be obtained. The produce of these processes is a spirit of nitre containing so much more phlegm, or watery moisture, than Glauber's spirit, as the vitriol employed in its preparation does more than an equivalent quantity of oil of vitriol.

The great demand which there is in sundry businesses for aquafortis has occasioned the preparation of it to become a trade by itself. Hence larger and less expensive instruments than those mentioned above, have been contrived. The common distilling vessel is a large iron pot, with an earthen, or stone-ware still-head, to which is adapted a large glass globe, or else a jar made of the same kind of clay as the head. The workmen are not at the trouble either of drying the vitriol, or pounding the nitre, but throw them both promiscuously into the pot, where the fire soon liquefies and mixes them together. The aquafortis prepared after this manner is extremely impure, and utterly unfit for many purposes, such in particular are the solutions of mercury and of silver; the violence of the fire, employed in the operation, never fails to elevate some of the metallic parts of the vitriol; the nitre is used rough or unrefined, which containing a portion of sea-

salt, sends over some of the marine along with the nitrous acid; nor are the ingredients free from bits of wood, or other vegetable matters, which burning in the process foul the spirit with an empyreumatic oil, giving it, at the same time, an high colour. If therefore common aquafortis be employed in any medicinal preparation, it ought to be previously purified: the most effectual method of doing which is the following.

678. *Purified aquafortis.*

Drop into the aquafortis a drop or two of solution of silver. If it becomes milky or cloudy, drop in a little more of the solution, till a fresh addition occasions no further change; allowing proper intervals for the white matter to settle, that the effect of a new addition may be the better perceived. Then pour the liquor into a glass retort, and distil in a sand-heat to dryness.

The milkiness produced by the solution of silver is a certain mark of marine or vitriolic acid in the aquafortis; the silver absorbing those acids, and forming with them a concrete which the liquor is incapable of holding dissolved. If the aquafortis is not made at all cloudy by this solution, we may be certain of its having been previously free from the least admixture of those heterogeneous acids; and when it ceases to become milky from a fresh addition, we may be equally certain, that how much soever it might have contained of them at first, they are now perfectly separated.

The solution of silver is to be made in aquafortis already purified. Where this cannot be had, the little quantity generally sufficient for the present purpose, may be made in the common impure sort of aquafortis, which will be purified during the dissolution itself. Put a thin bit of silver into a little of the aquafortis, and set the vial in a sand-heat; if the aquafortis is pure, numerous minute bubbles will issue from the silver on all sides, and the metal will gradually dissolve without altering the transparency of the liquor; but if the aquafortis contains marine or vitriolic acid, it will quickly become milky, those acids uniting with the silver, as in the above process, as fast as the nitrous acid dissolves it. As the white matter precipitates upon, and adheres to, the surface of the silver, so as to impede the further action of the menstruum; the liquor must be filtered, and treated in the same manner with a bit of fresh silver: if any milkiness still ensues, the operation must be repeated with another piece of the metal, till all the foreign acids are separated, and the silver is found to dissolve clear. Good aquafortis takes up about half its own weight of silver.

Instead of all these operose preparations, however, the Edinburgh college now order only a weak nitrous acid, composed of equal parts of strong spirit of nitre and water.

679. *Distilled vinegar, or spirit of vinegar.*

Let vinegar be distilled with a gentle heat as long as the drops fall free from an empyreuma. If some part of the spirit which comes over first be thrown away, the rest will be the stronger. *L.*

Distil a gallon of vinegar in glass vessels, throwing away the first two pounds of produce. The next four pounds are to be kept as spirit of vinegar; and the remainder, as being empyreumatic, kept for other purposes. *E.*

680. This process may be performed either in a com-

mon still with its head, or in a retort. The better kinds of wine-vinegar should be made use of: those prepared from malt-liquors, however fine and clear they may seem to be, contain a large quantity of a viscons substance, as appears from the sliminess and ropiness to which they are very much subject; this not only hinders the acid parts from arising freely, but likewise is apt to make the vinegar boil over into the recipient, and at the same time disposes it to receive a disagreeable impression from the fire. And indeed, with the best kind of vinegar, if the distillation be carried on to any great length, it is extremely difficult to avoid an empyreuma. The best method of preventing this inconvenience is, if a retort be made use of, to place the sand but a little way up its sides; and, when somewhat more than half the liquor is come over, to pour on the remainder a quantity of fresh vinegar equal to that of the liquor drawn off: this may be repeated three or four times; the vinegar supplied at each time being previously made hot: the addition of cold liquor would not only prolong the operation, but also endanger breaking the retort. If the common still is employed, it should likewise be occasionally supplied with fresh vinegar, in proportion as the spirit runs off; and this continued, until the process can be conveniently carried no farther: the distilled spirit must be rectified by a second distillation in a retort; or glass alembic; for though the head and receiver be of glass or stone-ware, the acid will contract a metallic taint from the pewter worm.

The residuum of this process is commonly thrown away as useless, though, if skillfully managed, it might be made to turn to good account; the most acid parts of the vinegar still remaining in it. Mixed with about three times its weight of fine dry sand, and committed to distillation in a retort, with a well-regulated fire, it yields an exceeding strong acid spirit, together with an empyreumatic oil, which taints the spirit with a disagreeable odour. This acid is nevertheless, without any rectification, better for some purposes (as a little of it will go a great way) than the pure spirit; particularly for making the sal diureticus of the London dispensatory; for there the oily matter, on which its ill flavour depends, is burnt out by the calcination.

681. The spirit of vinegar is a purer and stronger acid than vinegar itself, with which it agrees in other respects. The medical virtues of these liquors may be seen in the *Table of MATERIA MEDICA*. Their principal difference from the mineral acids consists in their being milder, less stimulating, less disposed to affect the kidneys and promote the urinary secretions, or to coagulate the animal juices.

§ 5. COMBINATION OF ACID with VINOUS SPIRIT.

682. All the mineral acids, on being mixed with spirit of wine, raise a great ebullition and heat. If the acid is in a small quantity, it unites intimately with the vinous spirit, so as to arise with it in distillation. The taste and all the characters of acidity are destroyed; and the mixture acquires a grateful flavour, which neither of the ingredients had before.

683. *Vitriolic ether.* E.

Take of rectified spirit of wine, 32 ounces by weight; oil of vitriol, one pound. Put the spirit into a glass

retort capable of bearing a sudden heat, and pour in the acid in a continued stream. Mix the two together by agitating them gently, but frequently; distil immediately in a sand-bath previously made hot, into a receiver cooled with water or snow. The fire in the mean time must be regulated in such a manner that the liquor must begin to boil as soon as possible, and continue to do so till 16 ounces by weight have come over. To the distilled liquor add two drams of the sharpest common caustic: then distil again out of a very high retort, and with a very gentle heat, into a very cold receiver, till 10 ounces by weight have come over.

684. *Dulcified spirit of vitriol.*

Mix two parts by weight of rectified spirit of wine with one part of vitriolic ether. E.

Take of the strong spirit or oil of vitriol, one pound; of rectified spirit of wine, one pint. Cautiously mix them together by little and little at a time, and distil the mixture, with a very gentle heat, till a black froth begins to arise: then immediately remove the whole from the fire, lest this froth should pass over into the recipient, and frustrate the operation. L.

When the method of making this spirit recommended by the London pharmacopoeia is adopted, a good deal of caution is requisite in mixing the two liquors. Some direct the spirit of wine to be put first into the retort, and the oil of vitriol to be poured upon it all at once; a method of procedure by no means advisable, as a violent heat and ebullition always ensue, which not only dissipate a part of the mixture, but hazard also the breaking of the vessel, to the great danger of the operator. Others put the oil of vitriol into the retort first; then by means of a funnel, with a long pipe that may reach down just to the surface of the acid, pour in the spirit of wine: if this is done with sufficient caution, the vinous spirit spreads itself on the surface of the oil of vitriol, and the two liquors appear distinct: on standing for a week or two, the vinous spirit is gradually imbibed without any commotion, and the vessel may then be safely shaken, to complete the mixture; but if the spirit is poured in too hastily at first, or if the vessel is moved before the two liquors have in some degree incorporated, the same effect ensues as in the foregoing case. The most secure way is, to add the oil of vitriol to the spirit of wine by a little quantity at a time, waiting till the first addition is incorporated before another quantity is put in: by this management, the heat that ensues is inconsiderable, and the mixture is effected without any inconvenience.

The distillation should be performed with an equable and very gentle heat, and not continued so long as till a black froth begins to appear; for before this time a liquor will arise of a very different nature from the spirit here intended. The several products are most commodiously kept apart by using a tubulated receiver, so placed, that its pipe may convey the matter which shall come over into a vial set underneath; the juncture of the retort and recipient is to be luted with a paste made of linseed meal, and further secured by a piece of wet bladder: the lower juncture may be closed only with some soft wax, that the vial may be occasionally removed with ease.

The true dulcified spirit arises in thin subtle vapours, which

which condense upon the sides of the recipient in straight striz. It is colourless as water, very volatile, inflammable, of an extremely fragrant smell, in taste somewhat aromatic.

After the fire has been kept up for some time, white fumes arise, which either form irregular striz, or are collected into large round drops like oil: on the first appearance of these, the vial (or the receiver, if a common one is made use of) must be taken away. If another be substituted, and the distillation continued, an acid liquor comes over of an exceeding pungent smell, like the fumes of burning brimstone. At length a black froth begins hastily to arise, and prevents our carrying the process further.

On the surface of the sulphureous spirit is found swimming a small quantity of oil, of a light yellow colour, a strong, penetrating, and very agreeable smell. This oil seems to be nearly of the same nature with the essential oils of vegetables. It readily and totally dissolves in rectified spirit of wine, and communicates to a large quantity of that menstruum the taste and smell of the aromatic or dulcified spirit.

The matter remaining after the distillation is of a dark blackish colour, and still highly acid. Treated with fresh spirit of wine, in the same manner as before, it yields the same productions; till at length, all the acid that remains unvolatilized being fatiated with the inflammable oily matter of the spirit, the compound proves a bituminous, sulphureous mass: which, exposed to the fire in open vessels, readily burns, leaving a considerable quantity of fixed ashes; in close ones, explodes with violence; and with fixed alkaline salts, forms a compound nearly similar to one composed of alkalies and sulphur.

Dulcified spirit of vitriol has been for some time greatly esteemed both as a menstruum and a medicine. It dissolves some resinous and bituminous substances more readily than spirit of wine alone, and extracts elegant tinctures from sundry vegetables; especially if rectified, from a little fixed alkaline salt, to separate any redundant acidity. As a medicine, it promotes perspiration and the urinary secretion, expels flatulencies, and in many cases abates spasmodic strictures, eases pains, and procures sleep: the dose is from 10 to 80 or 90 drops in any convenient vehicle. It is not essentially different from the celebrated anodyne liquor of Hoffman; to which it is, by the author himself, not unfrequently directed as a succedaneum.

The ether or ethereal spirit is the lightest, most volatile, and inflammable, of all known liquids. It is lighter than the most highly rectified spirit of wine, in the proportion of about seven to eight: a drop let fall on the hand evaporates almost in an instant, scarcely rendering the part moist. It does not mix, or only in a small quantity, with water, spirit of wine, alkaline lixiv, volatile alkaline spirits, or acids; but is a powerful dissolvent for oils, balsams, resins, and other analogous substances. Its medical effects are not as yet much known, though it is not to be doubted that a fluid of so much subtlety must have considerable ones. It has often been found to give ease in violent headaches, by being applied externally to the part; and to relieve the toothach, by being laid on the afflicted jaw. It has been given also internally, with benefit, in

whooping coughs and hysterical cases, from two or three drops to five and twenty, in a glass of wine or water, which should be swallowed as quick as possible, as the ether so speedily exhales.

685. *Dulcified spirit of nitre.*

Take a quart of rectified spirit of wine, and half a pound of Glauber's spirit of nitre. Mix them, by pouring the nitrous spirit into the other; and distil with a gentle heat, as long as the liquor which comes over does not raise any effervescence with lixivial salts. *L.*

Put three parts of rectified spirit of wine into a large bolt-head, and gradually add thereto one part of spirit of nitre. Digest them together for seven days, and then distil in a water-bath as long as any spirit comes over. *E.*

Here the operator must take care not to invert the order of mixing the two liquors, by pouring the vinous spirit into the acid; for if he should, a violent effervescence and heat would ensue, and the matter be dispersed in highly noxious red fumes. The most convenient and safe method of performing the mixture seems to be, to put the inflammable spirit into a large glass body with a narrow mouth, placed under a chimney, and to pour upon it the acid by means of a glass funnel, in very small quantities at a time; shaking the vessel as soon as the effervescence ensuing upon each addition ceases, before a fresh quantity is put in: by this means the glass will heat equally, and be prevented from breaking. During the action of the two spirits upon one another, the vessel should be lightly covered; if close stopped, it will burst; and if left entirely open, some of the more valuable parts will exhale.

The liquors, mixed together, should be suffered to rest for at least twelve hours, that the fumes may entirely subside, and the union be in some measure completed. The distillation should be performed with a very slow and well regulated fire; otherwise the vapour will expand with so much force as to burst the vessels. Wilson seems to have experienced the justness of this observation; and hence directs the juncture of the retort and receiver not to be luted, or but slightly; if a tubulated recipient, with its upright long pipe, be made use of, and the distillation performed with the heat of a water-bath, the vessels may be luted without any danger. This method has likewise another advantage, as it ascertains the time when the operation is finished. Examining the distilled spirit every now and then with alkaline salts, as directed above, is sufficiently troublesome; whilst in a water-bath we may safely draw over all that will arise, for this heat will elevate no more of the acid than what is dulcified by the vinous spirit.

Dulcified spirit of nitre has been long held, and not undeservedly, in great esteem. It quenches thirst, promotes the natural secretions, expels flatulencies, and moderately strengthens the stomach: it may be given from twenty drops to a dram in any convenient vehicle. Mixed with a small quantity of spirit of hartshorn, the *spiritus volatilis aromaticus*, or any other alkaline spirit, it proves a mild yet efficacious diaphoretic, and often notably diuretic; especially in some febrile cases, where such a salutary evacuation is wanted.

ed. A small proportion of this spirit added to malt-spirits, gives them a flavour approaching to that of French brandy.

§ 6. NEUTRAL SALTS.

686. WHEN any acid and any alkaline salts are mixed together, in such proportion that neither of them may prevail, they form by their coalition a new compound, called *neutral*. In all the combinations of this kind, (except some of those with vegetable acids), the alkali and acid are so strongly retained by one another, that they are not to be disunited by any degree of fire. How volatile soever the acid was by itself, if combined with a fixed alkali, it proves almost as fixed as the pure alkali: if the alkali is of the volatile kind, the compound proves also volatile, subliming in its whole substance, without any separation of its parts. There are, however, means of procuring this disunion by the intervention of other bodies, as we have already seen in the separation of the volatile alkali of sal ammoniac, and of the acids of nitre and sea-salt: but in all cases of this kind, only one of the ingredients of the neutral salt can possibly be obtained by itself, the separation of this happening solely in virtue of the superadded body uniting with the other.

There is another kind of compound salts, formed by the coalition of acids with earthy and metallic bodies. These salts differ from the true neutral ones in several obvious properties; some of them change blue vegetable juices to a green like alkalies, and others to a red like acids, while neutral salts make no change in the colour: mixed with boiling milk, they coagulate it, while neutral salts rather prevent its coagulation: from most of them the acid is disunited by fire, without the intervention of any additional matter, of which we have seen an instance in the distillation of the acid of vitriol: but the most distinguishing and universal character of these salts is, that solutions of them, on the addition of any fixed alkali, grow turbid, and deposit their earth or metal. It were to be wished, that custom had appropriated some particular name to the salts of this class, to prevent their being confounded, which several of them have often been, with the perfect neutral salts.

The following table exhibits, at one view, the several compound salts resulting from the union of each of the pure acids with each of the common alkalies and soluble earths; the acids being placed on the top, the alkalies and earths on the left hand, and the compound salts in the respective intersections; and is thus to be understood. In the upright columns, under each of the acids, are seen the several compound salts resulting from the union of that acid with the respective alkalies and earths on the left side. In the transverse columns, opposite to each particular alkali and earth, are seen the compound salts resulting from the union of that alkali or earth with the respective acids on the top; and conversely of each of the compound salts expressed in the table, the component parts are found on the top of the upright column, and on the left side of the transverse column, in whose intersection that particular salt is placed.

	VITRIOLIC ACID.	NITROUS ACID.	MARINE ACID.	ACETOUS ACID.
COMMON FIXED ALKALI.	Vitriolated tartar.	Common nitre.	Regenerated sea-salt.	Salt diureticus.
ALKALI of SEA SALT.	Glauber's salt.	Cubical nitre.	Sea-salt.	A salt similar to sal diuret.
VOLATILE ALKALI.	Philosophic sal ammon.	Volatile nitre.	Salt ammoniac.	Spiritus Mindereri.
CALCAREOUS EARTH.	Selenites.	Calcareous nitre.	Calcareous mucinate salt.	A tobacco-gent salt.
MAGNESIA.	Salt catharticus amarus.	Purgin salts, not distinguished by any particular name.		
Soluble earth of CLAY.	Alum.	Astringent salts, not distinguished by any particular name.		

687. Crystallization of salts.

This is a general operation on neutral and most of the other compound salts. It depends upon these principles: that water, of a certain degree of heat, dissolves, of any particular salt, only a certain determinate quantity: that, on increasing the heat, it dissolves more and more (except only in one instance, common salt) till it comes to boil; at which time, both its heat and dissolving power are at their height: that, in returning to its first temperature, it throws off again all that the additional heat had enabled it to dissolve: that, independently of any increase or diminution of heat, a gradual evaporation of the fluid itself will occasion a proportional separation of the salt; and that the particles of the salt, in this separation from the water, unless too hastily forced together by sudden cooling or strong evaporation, or disturbed by external causes, generally congregate into transparent and regularly figured masses, called *crystals*. The several salts assume, in crystallization, figures peculiar to each: thus the crystals of nitre are hexagonal prisms; those of sea-salt, cubes; those of alum, octohedral masses; while sal ammoniac shoots into thin fibrous plates like feathers.

The use of preparing salts in a crystalline form, is not merely in regard to their elegance, but as a mark of, and the means of securing, their purity and perfection. From substances not dissoluble in water, they are purified by the previous solution and filtration; by crystallization, one salt is purified from an admixture of such other saline bodies as dissolve either more easily or more difficultly than itself. For if two or more salts be dissolved together in a certain quantity of hot water, the salt which requires the greatest heat for its solution in that quantity of water, will first begin to separate

separate in cooling; and if the water is kept evaporating in an uniform heat, the salt which requires most water in that heat will be the first in crystallizing. In all cases of this kind, if the process is duly managed, the first shootings are generally well figured and pure; the succeeding ones, sooner or later, according to the quantity of the other salts in the liquor, retain an admixture of those salts, which they betray by their smallness and by their figure.

In order to the crystallization of saline solutions, it is customary to boil down the liquor till so much of the fluid has exhaled, as that the salt begins to congregate from it even while hot, forming a pellicle upon the surface exposed to the air; when this mark appears, the whole is removed into a cold place. This method seldom affords perfect crystals; for when water is thus saturated with the salt in a boiling heat, and then suddenly cooled, the particles of the salt run hastily and irregularly together, and form only a confused semitransparent mass. It is by slow concretion that most salts assume their crystalline form in perfection. The evaporation should be gentle, and continued no longer than till some drops of the liquor, in a heat below boiling, being let fall upon a cold glass plate, discover crystalline filaments: the liquor is then immediately to be removed from the fire into a less warm, but not a cold place; and the vessel covered with a cloth, to prevent the access of cold air, and the formation of a pellicle, which, falling down thro' the fluid, would disturb the regularity of the crystallization. This is the most effectual method for most salts; though there are some whose crystallization is to be effected, not by an abatement of the heat, but by a continued equable evaporation of the fluid; such in particular is sea-salt.

Salts retain in crystallization a portion of the aqueous fluid, without betraying any marks of it to the eye: on this their crystalline form appears in great measure to depend. The quantity of phlegm or water varies in different salts: dry crystals of nitre were found, on several careful trials, to contain about one twentieth of their weight; those of alum, one sixth; sea-salt, one fourth; borax, green vitriol, and the purging-salts, no less than one half. The same salt appears always to retain nearly the same quantity.

Some salts dissolve in spirit of wine: and here also, as in water, the solution is limited, though the salt is not easily recovered in a crystalline form. Such in particular are combinations of the nitrous acid with volatile alkalies, and with calcareous earths; of the marine acid with all the soluble earths; of the acetic acid with fixed and volatile alkalies. Scarce any of the compound salts, whose acid is the vitriolic, are affected by vinous spirits.

Salts differ greatly in their disposition to assume and retain a crystalline form. Many, even of the compound kind, imbibe humidity like fixed alkalies, so as to crystallize with difficulty; and when crystallized, or exsiccated by heat, to deliquesce again in the air. Such are the combinations of the nitrous and marine acid with all the soluble earths, and of the acetic acid with earths and alkalies. The vitriolic acid, on the other hand, forms, with all the substances it dissolves, permanent crystals; as do likewise the other mineral acids with all alkalies.

The crystallization of those salts, which are not dissoluble in spirit of wine, is generally promoted by a small addition of that spirit; which, absorbing the water, or weakening its dissolving power on the salt, disposes the salt to part from it more freely. The operator must be careful, however, not to add too much of the spirit, especially where the salt is composed of an earthy or metallic body united with the acid; lest it absorb the acid as well as the water, and, instead of a gradual and regular crystallization, hastily precipitate the earth or metal in a powdery form.

Mr Rouelle, of the French Academy of Sciences, has examined with great attention the phenomena of the crystallization of salts, and published the result of his observations in different volumes of the *Memoirs of that academy*. Among other curious particulars, he has given a general distribution of salts, in regard to their crystallization, which will be of practical utility to the artist.

He divides evaporation into three degrees: *insensible evaporation*, or that effected by the natural warmth of the atmosphere, from freezing, up to the heat of the summer's sun; *mean evaporation*, commencing with the sun's heat, and extending to that in which the exhaling steam is visible to the eye, and the liquor too hot to be endured by the hand; and *strong evaporation*, reaching from this period to boiling. He divides salts into six classes; the distinctions of which are taken from the degree of evaporation in which they crystallize most perfectly, from the figure of their crystals, their disposition to remain single or unite into clusters, and their receiving an increase from a continuance of the crystallization.

I. The first class consists of salts which crystallize into small plates or very thin scales. The crystals are single. They are, of all salts, those which crystallize most frequently on the surface of their solutions, which retain least water in their crystals, and require most to dissolve in. They crystallize most perfectly by insensible evaporation.

II. Salts whose crystals are cubes, cubes with the angles truncated, or pyramids of four or six sides. They form single, and change their figure by new accretions. By insensible evaporation they crystallize at the bottom, by mean evaporation at the surface, and by both kinds they prove perfect and regular: by strong evaporation the liquor contracts a pellicle, and in cooling yields few crystals, and those ill figured.

III. Salts whose crystals are tetrahedral, pyramidal, parallelopiped, rhomboidal, and rhomboidal parallelopiped; with the angles variously truncated according to different circumstances. They form single (except that some few unite by the bases), and change their figure by new accretions. They crystallize at the bottom, most perfectly by insensible evaporation: by mean and strong evaporation the liquor contracts a pellicle, and in cooling the crystals adhere to the pellicle, and prove confused and ill formed. They retain a large quantity of water.

Soluble salts
Sedative salts
See salt
Vitrified salt
Spirits, salts, marine, vegetable, Tincture
Alum. Borax. Citric acid. Seignet's salt. Green vitriol. Blue vitriol. White vitriol. Ferri-sulphate.

Prepara-
tions.Prepara-
tions.

IV. Salts whose crystals are flattened parallelo-
pipeded, with the extremities terminating in
two surfaces inclined to one another, so as to
form a point and acute angles with the large
sides. They cluster together, uniting by the
bases into tufts. The crystals are largest and
most regular by insensible evaporation: by
mean and hasty evaporation, a pellicle is
formed, and in cooling the crystals prove very
small. They retain a large quantity of water in
crystallization, and require little to dissolve in.

Soluble tartar. Tartar united
with volatile alkali. Tartar
united with effluvent tartar.

V. Salts whose crystals are very long, in form
of needles, prisms, or columns of different
surfaces. They shoot at the bottom, and cluster
together into tufts of regular figures. By
insensible evaporation they scarce ever crys-
tallize well. By mean and strong evaporation
they give a pellicle; and in slow cooling, if
the evaporation was not carried too far, they
yield perfectly well formed crystals, which
at first swim, but soon fall to the bottom. If
the evaporation was too long continued, the
crystals prove confused and ill formed.

Soluble tartar. Nitre. Vol.
Sulphur. Phos. sal. ammonia. Nitre. Vol.
Sulphur. Phos. sal. ammonia. Nitre. Vol.
Sulphur. Phos. sal. ammonia. Nitre. Vol.

VI. Salts whose crystals are in very small needles,
or of other indeterminate figures. None of
them crystallize by insensible evaporation, and
few of them by the mean degree. They re-
quire to be reduced by strong evaporation to
a thick consistence: they then contract a pel-
licle, and crystallize with confusion. If the
crystals are wanted regular, spirit of wine must
be used, or some other medium if the salt is
soluble in spirit. They readily dissolve in wa-
ter, and liquefy in the air.

Soluble tartar. Nitre. Vol.
Sulphur. Phos. sal. ammonia. Nitre. Vol.
Sulphur. Phos. sal. ammonia. Nitre. Vol.

688. *Purified nitre.* L.
Boil nitre in water till it is dissolved; filter the solu-
tion through paper; and then, after due evapora-
tion, set it by in a cold place, that the nitre may
shoot into crystals.

Common nitre contains usually a considerable propor-
tion of sea-salt; which in this process is separated, the
sea-salt remaining dissolved after greatest part of the
nitre has crystallized. The crystals which shoot after
the first evaporation, are large, regular, and pure;
but when the remaining liquor is further evaporated,
and this repeated a second or third time, the crystals
prove at length small, imperfect, and tipped with little
cubical globes of sea-salt.

When rough nitre, in the state wherein it is first ex-
tracted from the earths impregnated with it, is treated
in this manner, there remains at last a liquor, called
mother-ley, which will no longer afford any crystals.
This appears to participate of the nitrous and ma-
rine acids, and to contain an earthy matter dissolved
by those acids. On adding alkaline lixivium, the earth
is precipitated; and, when thoroughly washed with wa-
ter, proves insipid. If the liquor may be evaporated
to dryness, a bitterish saline matter is left; which be-
ing strongly calcined in a crucible, parts with the
acids, and becomes, as in the other case, insipid.

This earth has been celebrated as an excellent pur-
gative, in the dose of a dram or two; and, in smaller
doses, as an alterant in hypochondriacal and other dis-
orders. This medicine was for some time kept a great

secret, under the names of *magnesia alba*, *nitrous pa-
nacea*, *count Palmer's powder*, *il polvere albo Romano*,
podre de Sentinelli, &c. till Lancini made it public in
his notes on the *Metallobecka Vaticana*. It has been
supposed that this earth is no other than a portion of
the lime commonly added in the elixation of nitre at
the European nitre-works: but though the specimens
of magnesia examined by Neumann, and some of that
which has lately been brought hither from abroad,
gave plain marks of a calcareous nature; yet the true
magnesia must be an earth of a different kind, calca-
reous earths being rather astringent than purgative.
The earthy basis of the *sal catharticus amarus*, is found
to have the properties ascribed to the true magnesia of
nitre, and appears to be the very same species of earth:
from that salt therefore this medicine is now prepared,
as will be seen hereafter.

689. *Purified sal ammoniac.* L.

This salt is purified by solution in water, filtration,
and crystallization, after the manner above directed
for nitre.

The impurities of sal ammoniac are commonly such
as will not dissolve in water; and hence the purifica-
tion is effected by the solution and filtration. The
very last crystals seldom betray an admixture of any
other salt.

690. *Purified white vitriol, commonly called gilla of vitriol.* E.

Take eight ounces of white vitriol, half an ounce of
filings of zinc; water, one pound. Digest with a
gentle heat for some hours; then filter the liquor,
and set it to crystallize.

691. *Salt of vitriol.* L.

Take of white vitriol, one pound; strong spirit (call-
ed oil) of vitriol, one ounce by weight; water, as
much as is sufficient. Boil them together till the vi-
triol is dissolved; then filter the liquor; and af-
ter due evaporation, set it by in a cold place to crys-
tallize.

Here the intention is not to separate the ochery
matter of the vitriol, but to prevent its separating and
colouring the crystals. This is effectually answered
by the addition of the acid, by which it is kept dis-
solved.

692. *Burnt alum.* L. E.

Let alum be calcined in an iron or earthen vessel, so
long as it bubbles and swells up.

The bubbling or blistering proceeds from the phlegm
retained in the crystals: after that is expelled, the salt
cannot be made liquid by any degree of fire. Alum
is composed of vitriolic acid and an earth; and it is
remarkable, that combinations of that acid with all
earths, with most metals, and even with vegetable fixed
alkalies, are unsoluble.

The alum, thus deprived of its phlegm, proves con-
siderably stronger, and more acrid, inasmuch as to be
sometimes employed for consuming fungous flesh: it is
said to have an inconvenience of leaving a hardness up-
on the part.

693. *Calcined vitriol.*

Let green vitriol be calcined in an earthen vessel, with
an.

an open fire, till it becomes thoroughly dry; then breaking the vessel, take out the vitriol, and set it by for use, well clofed from the air. The vitriol is fufficiently calcined, if it has acquired a red colour at the fides and bottom of the vessel. *L.*

This process fucceeds tolerably well for fmall quantities, but does not anfwer fo perfectly for larger. As the action of the fire is exerted firft on the external parts of the mafs, thefe will be calcined firft, and, where the quantity is large, exhibit the mark of fufficient calcination, whilst the internal part remains almoft unchanged: and even if the process is ftill farther continued, the effect required will not be produced; for the outside growing firft hard, prevents the evaporation of the aqueous parts from within.

Expose any quantity of powdered green vitriol, in an unglazed earthen vefel, to the action of a moderate fire, till it becomes white. *E.*

This method is fufficiently troublefome: for unlefs the heat be very gentle, and the matter fpread very thin over the bottom of a broad fhallow vefel, it is almoft impoffible to avoid melting it, which makes it adhere to the fides of the pan, and renders the previous pulverifation an ufelefs labour.

The method ufually praftifed by the chemifts is, to place a deep earthen pan, with fome vitriol in it, upon a gentle fire: the vitriol foon liquefies, boils up, and by degrees incruftates to the fides of the vefel: fome more vitriol is then thrown in and fuffered to incruftate in the fame manner; and this procedure repeated till the pan is nearly full of the concreted matter, which proves of a whitifh colour, except on the outside next the pan (which muft be broken to take it out), where it appears yellowifh or reddifh, according to the continuance and degree of fire. If the vitriol be defired ftill farther dephelegmated, this may be commodioufly effected, by reducing the mafs into a grofs powder (which will now no longer melt); and then calcining it over a ftrong fire, in a fhallow iron pan, till it has gained the degree of drynefs required, which may be known from its colour.

694. Vitriolated tartar.

Difolve eight ounces of green vitriol in four pints of boiling water: and whilst the liquor continues boiling, throw into it falt of tartar, or any other alkaline falt, till no farther effervescence arifes upon a frefh addition; which generally happens when four ounces, or a little more, of the falt have been ufed. Filter the liquor thro' paper, and after due evaporation fet it by to cryftallize. *E.*

Here the acid of the vitriol forfakes the iron, which it was before in poffeffion of, to unite with the alkaline falt: particular care ought to be had that the quantity of alkali be fufficient to fully faturate the acid, otherwife it will not deposite all the metal. It is convenient, even after the faturating feems, from the effervescence ceafing, to be completed, to throw in a little more of the alkali: for by this means the preparation is fecured from containing any metallic matter; whilst the fuperfluous quantity of alkali can do no prejudice, as it remains uncryftallized.

It is remarkable, that although the vitriolic acid and fixed alkaline falt do each readily unite with wa-

ter, and ftrongly attract moifture even from the air; yet the neutral falt refulting from the combination of thefe two, vitriolated tartar, is one of the falts moft difficult of folution, very little of it being taken up by cold water. Hence fome have directed the liquor in this process to be filtered whilst very hot, fufpecting, that if it was fuffered to cool, great part of the falt would be thrown off and left upon the paper. The college, however, have avoided this inconvenience, by ordering a quantity of water which is found to be fufficient for keeping the falt difolved in the cold or at leaft in a moderate warmth.

Take oil of vitriol diluted with equal its quantity of warm water; put it into a large glafs vefel, and gradually drop into it a folution of purified potafh in twice its quantity of water, till the effervescence ceafes. Then filter the liquor, evaporate it till a pellicle appears upon the furface, and fet it by in a cold place to crytallize. *E.*

This an elegant, and one of the leaft troublefome ways of preparing this falt. The Edinburgh college, in former editions, ordered the acid liquor to be dropped into the alkaline: by the converse procedure, now received, it is obviously more eafy to fecure againft a redundancy of acidity: for the greater certainty in this point, it may be expedient, as in the foregoing process, to drop in a little more of the alkaline ley than the ceffation of the effervescence feems to require.

But though the manner of preparation, here directed, appears to be the moft commodious, there is one imperfection in the process, a deficiency in the quantity of water. There is not near water enough to keep vitriolated tartar difolved; and of confequence, as falt as the alkaline falt is neutralized by the acid, great part falls to the bottom in a powdery form. In the Leyden pharmacopeia, this inconvenience is judiciously provided againft: The oil of vitriol is diluted with four times its quantity of water; and the alkaline ley being gradually dropped into it till the point of faturation is obtained, four times the quantity of water is added, and the mixture boiled, that fuch part of the falt as had precipitated may be difolved: the liquor is then filtered while hot, and fet by to crytallize. In order to obtain perfect and well-formed cryftals, the liquor fhould not be fet in the cold, but continued in a moderate heat, fuch as the hand can fcarce-ly bear, that the water may flowly evaporate.

Vitriolated tartar, in fmall dofes, as a fteruple or half a dram, is an ufeul aperient; in larger ones, as four or five drams, a mild cathartic, which does not pafs off fo haftily as the *fal catharticus arnarus*, or *Glauber's falt*, and feems to extend its action further. The wholefale dealers in medicines have commonly fubftituted to it an article otherwife almoft ufelefs in their fhops, the refiduum of Glauber's fpirit of nitre. The purchafers ought, therefore, to infift upon the falt being in a crytalline form. The cryftals, when perfect, are oblong, with fix flat fides, and terminated at each end by a fix-fided pyramid: fome appear compofed of two pyramids joined together by the bafes, and many are irregular.

695. Vitriolated nitre. *L.*

Difolve in warm water the mafs which remains after the diftillation of Glauber's fpirit of nitre: filter the

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the solution through paper, and crystallize the salt.

This salt is not different from the *vitriolated tartar*, being composed of the vitriolic acid, and the alkaline basis of nitre; which alkali is no other than the common vegetable fixed alkaline salt, as salt of tartar or potash: it is, in effect, from the ashes of vegetables, that the nitre prepared in Europe receives its alkaline basis. If any unchanged nitre remains in the mass, it is left dissolved in the water while the vitriolated alkali crystallizes.

696. *Sal polychrestum, or salt of many virtues.*
Take of nitre in powder, flowers of sulphur, of each equal parts. Mingle them well together, and inject the mixture, by little and little at a time, into a red-hot crucible: after the deflagration ceases, keep the crucible in the fire for an hour. The salt may be purified by dissolving it in warm water, filtering the solution, and exhaling it to dryness; or by crystallization.

This is another method of uniting the vitriolic acid with the common vegetable fixed alkali. Both the nitre and the sulphur are decomposed in the operation: the acid of the nitre, and the inflammable principle of the sulphur, detonate together, and are dissipated; while the acid of the sulphur remains combined with the alkaline basis of the nitre. The shops accordingly have substituted to the *sal polychrest* the foregoing preparation.

697. *Sal prunelle. E.*
Take of pure nitre, reduced to powder, two pounds; flowers of sulphur, one ounce. Melt the nitre in a crucible, and sprinkle into it the sulphur by little at a time. When the deflagration is over, pour out the melted salt upon a clean, dry, and warm brass plate, so as to form it into cakes.

Those who prepare *sal prunell* in large quantities, make use of a clean iron pot instead of a crucible; and, when the nitre is melted, and the sulphur deflagrated, take out the salt with an iron ladle, and pour it into brass moulds kept for this purpose. The previous pounding of the nitre, directed above, may be as well omitted, as occasioning a needless trouble.

This preparation was formerly in great esteem, and is sometimes still ordered in prescription.

698. *The cathartic salt of Glauber, commonly called sal mirabile. L. E.*
Dissolve in warm water the mass which remains after the distillation of spirit of sea-salt: filter the solution, and crystallize the salt.

The title of this salt expresses its medical virtues. Taken from half an ounce to an ounce or more, it proves a mild and useful purgative; and in smaller doses, largely diluted, a serviceable aperient and diuretic. The shops frequently substitute to it the *sal catharticus amarus*, which is nearly of the same quality, but somewhat more unpleasant, and, as is said, less mild in operation: They are very easily distinguishable from one another, by the effect of alkaline salts upon solutions of them. The solution of Glauber's salt suffers no visible change from this addition, its own basis being a true fixed alkali: but the solution of

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the *sal catharticus amarus* grows instantly white and turbid; its basis, which is an earth, being extricated copiously by the alkaline salt: as in the following process.

699. a. *Magnesia alba, or White magnesia. E.*
Dissolve *sal catharticus amarus* in a sufficient quantity of water. Filter the solution; and add to it a filtered ley of potash, so long as a fresh addition continues to occasion any milkiness. A white powder will precipitate; which, being separated from the liquor is to be boiled for some time in water, and afterwards dried.

This powder appears to be the same species of earth with that obtained from the mother ley of nitre (see n° 688.) which was for several years a celebrated secret in the hands of some particular persons abroad. Hoffman, who describes the preparation of the nitrous magnesia, gives it the character of an useful antacid, a safe and inoffensive laxative in doses of a dram or two, and diaphoretic and diuretic when given in smaller doses of fifteen or twenty grains. Since this time it has had a considerable place in the practice of foreign physicians, and now begins to come into esteem among us, particularly in heartburns, and for preventing or removing the many disorders which children are so frequently thrown into from a redundancy of acid humours in the first passages: it is preferred, on account of its laxative quality, to the common absorbents, which (unless gentle purgatives are given occasionally to carry them off) are apt to lodge in the body, and occasion a coliciveness very detrimental to infants.

Though the preparation of this medicine is now commonly known, its nature and properties are very little understood: whilst some suppose it to possess uncommon virtues, others affirm, that, when duly edulcorated, it is in no respect different from calcined hartshorn, or any other simple animal or vegetable earth. The following observations of its real properties will be sufficient to determine this point.

Magnesia alba, when prepared in perfection, is a white and very subtle earth, perfectly void of smell or taste, of the class of those which dissolve in acids. It dissolves freely, even in the vitriolic acid; which, in the common way of making solutions, takes up only an inconsiderable portion of other earths. Combined with this acid, it forms a bitter salt, very easily soluble in water; while the common absorbents form with the same acid almost insipid concretes, very difficult of solution. Solutions of magnesia in all acids are bitter and purgative; while those of the other earths are more or less austere and astringent. A large dose of the magnesia, if the stomach contains no acid to dissolve it, does not purge or produce any sensible effect: a moderate one, if an acid is lodged there, or if acid liquors are taken after it, procures several stools; whereas the common absorbents, in the same circumstances, instead of loosening, bind the belly. It is obvious, therefore, that magnesia is specifically different from the other earths, and that it is applicable to useful purposes in medicine.

699. b. *Burnt magnesia. E.*
Let any quantity of magnesia be put into a crucible, and

and heated hot, in which state keep it for two hours; then take it out, and preserve it in a glass bottle well stoppered.

700. *Cubical nitre.*

Dissolve chalk or lime in purified aquafortis; and add the solution by degrees to a solution of Glauber's salt in water, so long as a fresh addition produces any milkiness: a white powder will precipitate; after which the liquor is to be filtered, and, after due evaporation, set to crystallize.

In this process, both the solutions are decomposed, and two new compounds produced. The vitriolic acid of the Glauber's salt unites with the chalk; and forms with it an indissoluble selenitic concrete, which of course precipitates; while the alkali of the Glauber's salt, and the nitrous acid, unite into a neutral salt, which is separated from the liquor by crystallization; the crystals are rhomboidal, of a cooling taste, greatly resembling that of common nitre. How far this salt differs from common nitre in its medicinal virtue, is not known. The process is here inserted, partly as being a very instructive one in regard to the transpositions which happen on the mixture of different saline bodies, and partly as affording the most convenient means of obtaining the pure alkaline basis of sea-salt. In the distillation of spirit of salt, that basis was disunited from its own acid, and combined with the vitriolic: it is here transferred from the vitriolic to the nitrous; and in n° 644, we have given a method of displacing or destroying the nitrous acid, and leaving the alkali, that was combined with it, pure.

701. *Spirit of sea-salt coagulated. L.*

Drop, into Glauber's spirit of sea-salt, a ley of fixed alkaline salt, till all effervescence ceases; then evaporate the mixture to dryness.

This preparation is inserted, under the same title, in the Württemberg pharmacopœia. It has been commonly called *regenerated sea-salt*, though with little propriety, as it differs from that salt in its basis; the common vegetable alkali being here substituted to the mineral alkali of sea-salt. How far it differs from sea-salt in its medicinal qualities, hath not yet been determined: it is manifestly sharper in taste, and somewhat more diffcult both of solution in water and of fusion in the fire.

702. *Regenerated tartar. E.*

Put any quantity of dry salt of tartar, powdered, into a large glass vessel; and pour thereon, by little and little, as much distilled vinegar as is necessary to saturate it. Filter the liquor; and exhale it, over a very gentle fire, to dryness, taking great care that the matter contract not an empyreuma. On the salt which remains, pour as much more spirit of vinegar as will saturate it; then dehydrate the liquor again, and carefully exsiccate it into a dry salt.

If the common alkalies are made use of for this process, they should be previously purified, by solution and crystallization, from the neutral salt which they generally contain. The distilled vinegar may be perfectly free from any empyreumatic taint: it is not necessary to dephlegmate it, or throw away the first

runnings in the distillation, since these contain a portion of the acid (the part here wanted) as well as the phlegm.

It is difficult to hit the point of saturation betwixt the acetous acid and the alkaline salt. After about fourteen parts of strong distilled vinegar have been gradually poured upon one of the fixed salt, the addition of a little more of the acid will not occasion any further effervescence in the cold; but if the mixture be now strongly stirred and well heated, the effervescence will appear afresh; upon which some more vinegar is to be added, till it again ceases. The saturation is not as yet complete; for upon exhaling the aqueous parts, the remaining salt still effervesces with fresh vinegar. When so much of the acid has now been added, that no marks of fermentation any longer appear, a little more of the vinegar may be poured in before you proceed to the last evaporation; by this means, the saturation of the alkali will be secured, whilst, if the acid prevails, the superfluous quantity of it will exhale.

The salt thus prepared, is of a dark-brown colour, a peculiar, not ungrateful odour, a penetrating, saponaceous, saline taste, in nowise alkaline or acid. Its brown colour and saponaceous quality proceed from the oily parts of the vinegar; the deuration of the salt from this oil, is not in the foregoing process insisted on. In the London pharmacopœia, the salt is ordered to be purified to perfect whiteness, under the title of

703. *Diuretic salt. L.*

Take a pound of any fixed alkaline salt; and boil it, with a very gentle heat, in four or five times its weight of distilled vinegar. When the fermentation ceases, add more distilled vinegar; and proceed with fresh additions thereof, until, the vinegar being almost evaporated, fresh vinegar will no longer raise any fermentation; which generally happens by the time that twenty pounds of distilled vinegar have been used. Then slowly exhale to dryness.—Melt the remaining impure salt for a little time, but not too long, over a gentle fire; then dissolve it in water, and filter the solution through paper. If the melting has been duly performed, the filtered liquor will be limpid and colourless as water; but if otherwise, of a brown colour.—Evaporate the limpid solution, with an exceeding gentle heat, in a shallow glass vessel; occasionally stirring the salt as it dries, that its moisture may be the sooner exhaled. Afterwards keep it for use in a vessel very closely stopped; for it will liquefy by the air.

This salt ought to be of perfect whiteness; and should totally dissolve both in water and in spirit of wine, without leaving any faeces. If the salt, though ever so white, deposits any faeces in spirit of wine; the whole of it must be dissolved in that spirit, the solution filtered, and exsiccated again.

The purification of this salt is not a little troublesome. The operator must be particularly careful in melting it, not to use too great a heat, or to keep it liquefied too long: a little should be occasionally taken out, and put into water; and as soon as it begins to part freely with its black colour, the whole is to be removed from the fire. In the last drying,

drying, the heat must not be so great as to melt it; otherwise it will not prove totally soluble. If the solution in spirit of wine be exsiccated, and the remaining salt liquefied with a very soft fire, it gains the leafy appearance which has procured it the name of *terra foliata*.

These salts are medicines of great efficacy, and may be so dosed and managed as to prove either mildly cathartic, or powerfully diuretic: few of the saline deobstruents come up to them in virtue. The dose is from half a scruple to a dram or two. A bare mixture of alkaline salt and vinegar without exsiccation, is not perhaps much inferior as a medicine to the more elaborate salt.

704. *Spirit of Mindererus*. E.

Take any quantity of the volatile alkaline salt of sal ammoniac, and gradually power upon it distilled vinegar, till the effervescence ceases; occasionally stirring the mixture, to promote the action of the vinegar on the salt.

This is an excellent aperient saline liquor. Taken warm in bed, it proves commonly a powerful diaphoretic or sudorific; and as it operates without heat, it has place in febrile and inflammatory disorders, where medicines of the warm kind, if they fail of procuring sweat, aggravate the distemper. Its action may likewise be determined to the kidneys, by walking about in a cool air. The common dose is half an ounce, either by itself, or along with other medicines adapted to the intention. Its strength is not a little precarious, depending in great measure on that of the vinegar; an inconvenience which cannot easily be obviated, for the saline matter is not reducible to the form of a concrete salt.

§ 7. ANOMALOUS SALTS.

705. *Crytals of tartar*.

Let powdered white tartar be boiled in twenty times its quantity of water, till perfectly dissolved; and the solution, whilst it continues hot, passed through filtering paper, or a woollen cloth, and received in a wooden vessel: then expose it for a night or longer to the cold air, that crytals may form themselves, and shoot to the sides of the vessel: the water being now poured off, the crytals are to be collected and dried for use.

The filtration of the solution of tartar through paper succeeds very slowly; and unless managed with a good deal of address, not at all: for as soon as the boiling liquor begins to grow sensibly less hot, it deposits much of the tartar all over the surface of the paper, which hinders the remainder from passing through. Zwelfer, in his animadversions on this process in the Augustan pharmacopœia, directs the solution to be clarified with whites of eggs, and strained only through a linen cloth. He likewise judiciously orders the vessel to be close covered, and the crystallization performed in a warm place: for if the solution be suffered to cool very fast, it is in vain to expect any appearance of crytals; the tartar will inevitably be precipitated to the bottom of the vessel in the form of sand. And indeed, the business of refining and crystallizing tartar is so very troublesome, and requires so large

an apparatus, that scarce any of the apothecaries, or even of the trading chemists, are at the trouble of it; but either import it ready refined from Hollaud, or purchase it from some people here who make it their sole business.

706. *Cream of tartar*.

Take any quantity of solution of tartar, made as in the foregoing process, and passed through a filter. Boil it over the fire, till a thick cuticle appears on the surface, which is to be taken off with a wooden skimmer bored full of holes; continue the boiling till a fresh cuticle arises, which is to be taken off as the foregoing, and the operation repeated till the whole quantity of liquor is thus consumed. Afterwards dry all the cuticles together in the sun.

The preparation of this in no respect differs from crytals of tartar reduced to powder. Indeed the purchaser ought always to prefer the crytals; for the powder is often sophisticated with saline substances of another kind.

707. *Soluble tartar*. L. E.

Dissolve a pound of any fixed alkaline salt in a gallon of boiling water; and gradually throw in crytals of tartar, as long as a fresh addition thereof raises any effervescence; which generally ceases before three pounds of the crytals have been used. Then filter the liquor; and, after due evaporation, set it by to crystallize, or evaporate it to dryness, and keep the remaining saline mass for use.

Common white tartar is perhaps preferable for this operation to the crytals usually met with. Its impurities can here be no objection; since it will be sufficiently depurated by the subsequent filtration.

Soluble tartar, in doses of a scruple, half a dram, or a dram, is a mild cooling aperient; two or three drams commonly loosen the belly; and an ounce proves pretty strongly purgative. Malouin says it is equal in purgative virtue to the cathartic salt of Glauber. It is an useful addition to the purgatives of the refinous kind, as it promotes their operation, and at the same time tends to correct their griping quality. But it must never be given in conjunction with any acid: for all acids decompose it; absorbing its alkaline salt, and precipitating the tartar.

708. *Rochelle salt*. Ph. Par.

Let the salt extracted from the ashes of the kelp or kali of Alicant be calcined till it melts; then dissolve in water, the solution filtered, and after due evaporation set by, that the salt may shoot into pure white crytals. Dissolve crytals of tartar in boiling water, and saturate the solution with the crytals of kali: the proportions necessary for this purpose will be, about sixteen ounces of the latter to twenty of the former. Duly exhale the liquor in the heat of a water-bath; and after filtration, set it in the cold to crystallize.

This is a species of soluble tartar, made with the salt of kali or soda, with the mineral alkali or basis of sea-salt: It crystallizes far more easily than the preceding preparation, and does not, like it, grow moist in the air. It is also considerably less purgative, but is equally decomposed by acids. It appears to be

a very elegant salt, and begins now to come into esteem in this country, as it has long been in France.

709. *Essential salt of sorrel.*

Let the juice of sorrel, after settling and decantation from the feces, be evaporated, till only one-third remains; then strained through a flannel-bag, and exhaled again till a pellicle appears upon the surface. Put the liquor into a glass vessel; and, a little oil olive being poured upon the top, let it by in a cellar till plenty of crystals are formed: these are to be gently washed with water, and afterwards dried.

After the same manner, essential salts are obtained from all acid, austere, astringent, and bitterish plants that contain but a small quantity of oil.

Herbs of a dry nature are to be moistened, in the bruising, with a little water, that the juice may be the more easily pressed out

The waters of these plants, which are in vain endeavoured to be drawn over by distillation, may be obtained by dissolving a suitable quantity of their essential salts in common water.

713. The process for obtaining these salts is very tedious, inasmuch as scarce to be completed in less than seven or eight months; and the quantity of salt which the juices afford, is extremely small: hence they are hardly ever made or expected in the shops.

714. The virtues of the essential salts have not been sufficiently determined from experience.

710. *Flowers of benzoine.*

Put some powdered benzoine into an earthen pot placed in sand; and with a gentle heat sublime the flowers into a conical paper-cap fitted to the pot.

—Or the sublimation may be performed in a retort; the flowers will arise with a soft heat into the neck.

—If the flowers have any yellow tinge, mix them with tobacco-pipe clay, and sublime again. *L.*

The sublimation is to be performed in a glazed earthen pot, and repeated in the same instruments with fresh parcels of benzoine, till the paper-cap becomes foul with oil. *E.*

Benzoine, exposed in a retort to a gentle fire, melts and sends up into the neck white shining crystalline flowers, which are followed by an oily substance. On raising the heat a little, (a recipient being applied to the neck of the retort), a thin yellowish oil comes over, intermingled with an acid liquor, and afterwards a thick butyraceous substance: this salt, liquefied in boiling water, gives out to it a considerable quantity of saline matter, (separable by filtration and proper exhalation), which appears in all respects similar to the flowers.

It appears, therefore, that the whole quantity of flowers which benzoine is capable of yielding, cannot be obtained by the above processes, since a considerable portion arises after the time of their being discontinued: the greatest part of the flowers arises with a less degree of heat than what is necessary to elevate the oil; but that if the operation is hastily conducted, or if the fire is not exceeding gentle, the oil will arise along with the flowers, and render them foul. Hence in the way of trade, it is extremely difficult to prepare them of the requisite whiteness and purity: the heat which becomes necessary when large quantities of the

benzoine are employed, being so great as to force over some of the oil along with them.

In order therefore to obtain these flowers in perfection, only a small quantity of benzoine should be put into the vessel at a time: and that this may not be any impediment to the requisite dispatch, a number of shallow, flat-bottomed, earthen dishes may be employed, each fitted with another vessel inverted over it. With these you may fill a sand-furnace, having fresh dishes charged in readiness to replace those in the furnace as soon as the process shall appear finished in them: the residuum of the benzoine should be scraped out of each of these vessels before a fresh parcel is put in.

These flowers, when made in perfection, have an agreeable taste and fragrant smell. They totally dissolve in spirit of wine, and likewise by the assistance of the heat in water; but separate again from the latter upon the liquor's growing cold, shooting into fine spicula, which unite together into irregular masses. By the mediation of sugar, they remain suspended in cold water, and thus form an elegant balsamic syrup. Some have held them in great esteem, as pectoral and sudorific, in the dose of half a scruple or more: but the present practice rarely makes use of them, on account of the offensive oil which, as usually prepared, they are tainted with, and from which a fresh sublimation from tobacco-pipe clay does not free them so effectually as might be wished. The observations above related point out a method of depurating them more perfectly, viz. by solution, filtration, and crystallization.

711. *Salt of borax, called sedative salt.*

Put eight ounces of powdered borax into a wide-necked retort; pour thereon three ounces of water, and then add three ounces of oil of vitriol. Place the retort in a proper furnace, adapt to it a receiver, and increase the fire till the vessel becomes red-hot. The sedative salt will arise into the neck in form of thin shining plates, which are to be swept out with a feather; and a little liquor will pass into the receiver. When the matter in the retort is grown cool, pour back upon it the distilled liquor, and sublime again. Repeat this process so long as the borax continues to yield any considerable quantity of saline flowers. *Or,*

Dissolve the borax in a sufficient quantity of warm water, and add thereto the oil of vitriol. Evaporate this mixture till thin plates begin to appear upon the surface; then suffer the fire to decay, and let the vessel stand unmoved till plenty of crystals are formed, which are to be well rinsed with cold water, and then dried for use.

In the preparation of this salt by sublimation, the fire must be expeditiously raised when the matter begins to grow dry; for it is only at this period that the salt sublimes. The sublimed salt itself, in a perfectly dry state, proves fixed in the fire; if moistened with water, and then exposed to a smart heat, part of it continues to rise till the moisture is wholly exhaled; after which, nothing more can be forced up by heat till the salt is again moistened. Hence the use of returning the distilled liquor, and repeating the sublimations. Lemery says, he found flowers continue to rise till the thirty-sixth sublimation; and that the

quantity obtained by all these sublimate's amounted to half an ounce and thirty-five grains from two ounces of borax.

The process of crystallization is less troublesome than that by sublimation; but the salt proves generally less white, and is apt likewise to retain a part of the Glauber's salt, especially if the evaporation is too long protracted.

The sedative salt appears to the taste a neutral salt; but, examined with alkalies, has the properties of an acid, effervescent, uniting, and crystallizing with them, and destroying their alkaline quality. It dissolves both in water and in spirit of wine, though not very readily in either. As to its virtue, it is supposed to be a mild anodyne (whence its name) to calm the heat of the blood in burning fevers, to prevent or remove delirious symptoms, and allay spasmodic affections, whether hypochondriacal or hysterical, at least for a time. The dose is from two to eighteen grains in any proper liquor.

712. Spirit, salt, and oil, of amber. E.

Mix powdered white amber with thrice its weight of clean sand, and put them into a glass retort, of which the mixture may fill one half: then adapt a large receiver, and distil in a sand-furnace, with a fire gradually increased. At first a spirit will come over with some yellow oil; then more yellow oil along with a little salt; and upon raising the heat, more of the salt, with a reddish coloured oil.—When the distillation is finished, empty the liquor out of the receiver; and having collected together the salt which adheres to the sides, dry it by gentle pressure between the folds of some spongy paper.—The oil may be separated from the spirit by filtration, and afterwards rectified by four distillations, using very clean retorts, and leaving an eighth part of the oil each time, which is to be thrown away as useless.—The salt is to be purified by solution in water and crystallization.

In the distillation of amber, the fire must for some time be continued gentle, scarce exceeding the degree at which water boils, till the aqueous phlegm and thin oil have arisen; after which it is to be slowly increased. If the fire was urged hastily, the amber would swell up, and rise in its whole substance into the receiver, without undergoing the required decomposition or separation of its parts. When sand or other like intermedia are mixed with it, it is less subject to this rarefaction, and the fire may be raised somewhat more expeditiously; though this little advantage is perhaps more than counterbalanced by the room which the sand takes up in the retort.

Our chemists generally leave the receiver unluted, that it may be occasionally removed as the salt rises and concretes in the neck of the retort; from whence it is every now and then scraped out, to prevent the oil from carrying it down into the receiver. When a gross thick oil begins to arise, and no more salt appears, the distillation is stopped, though it might perhaps be continued longer to advantage.

713. The spirit of amber, so called, is no more than a solution of a small portion of the salt in phlegm or water; and therefore is very properly employed for dissolving the salt in order to its crystallization.

721. Pure salt of amber has a penetrating, sub-stringent acid taste. It dissolves both in water and in rectified spirit, though not readily in either, and scarcely at all in the latter without the assistance of heat: of cold water in summer, it requires for its solution about twenty times its own weight; of boiling water, only about twice its weight. Expelled in a glass vessel, to a heat a little greater than that of boiling water, it first melts, then rises in a white fume, and concretes again in the upper part of the glass into fine white flakes, leaving, unless it was perfectly pure, a little coaly matter behind. It effervesces with alkalies both fixed and volatile, and forms with them neutral compounds, greatly resembling those composed of the same alkalies and vegetable acids. Mixed with acid liquors, it makes no sensible commotion. Ground with fixed alkaline salts, it does not exhale any urinous odour. By these characters, it is conceived this salt may be readily distinguished from all the other matters that have been mixed with or vended for it. With regard to its virtue, it is accounted aperient, diuretic, and, on account of its retaining some portion of the oil, antihysterical. Boerhaave gives it the character of *diureticorum et antihystericalium princeps*. Its great price, however, has prevented its coming much into use; and perhaps its real virtues are not equal to the opinion generally entertained of them.

714. The rectified oil has a strong bituminous smell, and a pungent acid taste. Given in a dose of ten or twelve drops, it heats, stimulates, and promotes the fluid secretions: it is chiefly celebrated in hysterical disorders, and in deficiencies of the uterine purgations. Sometimes it is used externally in liniments for weak or paralytic limbs, and rheumatic pains. This oil differs from all those of the vegetable kingdom, and agrees with the mineral petrolea, in not being soluble, either in its rectified or unrectified state, by spirit of wine, fixed alkaline lixivia, or volatile alkaline spirits; the oil, after long digestion or agitation, separating as freely as common oil does from water.

SECT. IX. Preparations of sulphur.

715. Flowers of Sulphur. L.

SUBLIME sulphur in proper vessels; and reduce the flowers that concrete into powder, either in a wooden mill, or in a marble-mortar with a wooden pestle.

This process is rarely attempted by the apothecaries, a large apparatus being necessary for performing it to advantage. Those who prepare the flowers of brimstone in quantity, use for the subliming vessel a large iron pot, capable of holding two or three hundred weight; this communicates with an arched chamber, lined with glazed tiles, which serves for the recipient.

This preparation of sulphur makes no change in its qualities; only separating its impurities, and at the same time reducing it into a finer powder than it can easily be brought to by other means. At the bottom of the subliming vessel there remains a ponderous grey-coloured mass, composed of sand, earth, stony and sometimes metallic matters, with a small portion of sulphur that has escaped the subliming heat. This is usually broken in pieces, and vended in the shops under

der the name of *sulphur vivum*.

716. *Washed flowers of sulphur. L.*

Pour upon the flowers as much water as will arise to the height of four fingers above them, and boil them for some time; then pouring off this water, let some cold water be added, and thoroughly wash the flowers; after which they are to be dried for use.

As the flowers of sulphur are generally sublimed into very capacious rooms, which contain a large quantity of air, or in vessels not perfectly close; some of those that arise at first are apt to take fire, and thus are changed into a volatile acid vapour, which mingling with the flowers that sublime afterwards, communicates to them a notable degree of acidity. In such case the ablation here directed is for the general use of the medicine absolutely necessary; for the flowers, thus tainted with acid, sometimes occasion gripes, and may in other respects be productive of effects different from those of pure sulphur.

717. *Thick balsam of sulphur. E.*

Take eight ounces of olive-oil, and one ounce of flowers of sulphur. Boil them together over a gentle fire, keeping them continually stirring, till they come to the consistence of a balsam.

Lined oil more readily dissolves sulphur than olive, and a preparation made with it is reckoned somewhat less disagreeable. The vessel they are boiled in ought to be capable of holding at least three times the quantity of the ingredients. As soon as the oil begins to act upon the sulphur, which happens nearly at the point of ebullition, the mixture rarifies very much, so as, if not prudently removed from the fire, to run over into the furnace; and as the matter is very susceptible of flame, dangerous consequences may ensue, especially if the quantity is large. The operator ought therefore to be upon his guard in the management of this process.

718. *Balsam of sulphur with Barbadoes tar. L.*

This is made after the same manner as the foregoing, by using Barbadoes tar instead of the oil.

719. *Balsam of sulphur with oil of turpentine.*

Take two ounces of washed flowers of sulphur, and six ounces of oil of turpentine. Digest them together in a sand-heat, till the oil is saturated with the sulphur.

720. *Balsam of sulphur with oil of aniseed.*

Take two ounces of washed flowers of sulphur; six ounces of oil of turpentine; and four ounces of essential oil of aniseeds. Digest them together as in the preceding process.

These preparations are more conveniently and safely made in a tall glass body, with the mouth at least an inch in diameter, than in the circulatory or close vessels in which they have commonly been directed to be prepared: for when the sulphur and oil begin to act vehemently upon each other, they not only rarify into a large volume, but likewise throw out impetuously great quantities of an elastic vapour, which, if the vessels are closed, or the orifices not sufficient to allow it a free exit, infallibly burst them: Hoffmann relates a very remarkable history of the effects of an ac-

cident of this kind. In the vessel above recommended, the process may be completed, without danger, in four or five hours, by duly managing the fire; which should be very gentle for some time, and afterwards increased so as to make the oil just bubble or boil, in which state it should be kept till all the sulphur appears to be taken up.

Essential oils, employed as menstrua for sulphur, undergo a great alteration from the degree of heat necessary for enabling them to dissolve the sulphur; and hence the balsams have not near so much of their flavour as might be expected. It should therefore seem more eligible to add a proper quantity of the essential oil to the simple balsam: these readily incorporate by a gentle warmth, if the vessel be now and then shaken. Sixteen parts of essential oil, and six of the *thick balsam*, compose a balsam more elegant than those made in the foregoing manner, and which retains so much of the flavour of the oil as is in some measure sufficient to cover the taste of the sulphur and render it supportable.

Balsams of sulphur have been strongly recommended in coughs, consumptions, and other disorders of the breast and lungs. But the reputation which they have had in these cases does not appear to have been built upon any fair trial or experience of their virtues. They are manifestly hot, acrimonious, and irritating; and therefore should be used with the utmost caution. They have frequently been found to injure the appetite, offend the stomach and viscera, parch the body, and occasion thirst and febrile heats. The dose is from 5 to 20 drops. Externally, they are employed for cleansing and healing foul running ulcers: Boerhaave conjectures, that their use in these cases gave occasion to the virtues ascribed to them when taken internally.

721. *Precipitated sulphur. L.*

Boil flowers of sulphur in water, with thrice their weight of quicklime, till the sulphur is dissolved. Filter the solution, and drop into it some of the weak spirit of vitriol: this will throw down a precipitate, which is to be washed in fresh portions of water, till it becomes insipid.

722. *Lac sulphuris.*

Boil the hepar sulphuris, reduced to powder, in four times its quantity of water for three hours; adding more water if there is occasion. Then filter the solution whilst hot; and drop it into spirit of vitriol, till the effervescence ceases; a powder will be precipitated to the bottom, which is to be washed with hot water, and afterwards dried for use.

The method of preparing this lac, as it is called, with hepar sulphuris, is the most expeditious, and least troublesome, provided the hepar † be well made; and, on the other hand, quicklime gives the preparation a † See *Chemistry*, more saleable whiteness. Some have been accustomed to add to the quicklime a portion of alkaline salt, with a view to promote its dissolving power.

The medicine is nearly the same in both cases. It would be exactly the same, if the precipitation was performed with any other acid than the vitriolic: for this acid forms with the dissolved lime a selenitic concrete, which precipitates along with the sulphur, and is not afterwards separable by any ablation; whilst the

neutral salt, which that acid forms with the fixed alkali of the hepar, may be totally dissolved and washed off by repeated ablution with hot water, and the combinations of all the other acids, both with the lime and alkali, are separated by cold water. It is probably to the admixture of the white felenitic matter, resulting from the vitriolic acid and lime, that the finer colour of the preparation made with lime is owing.

Pure lac sulphuris is not different in quality from pure sulphur itself; to which it is preferred in unguents, &c. only on account of its colour. The whiteness does not proceed from the sulphur having lost any of its parts in the operation, or from any new matter superadded: for if common sulphur be ground with alkaline salts, and set to sublime, it arises of a like white colour, the whole quantity of the alkali remaining unchanged; and if the lac be melted with a gentle fire, it returns into yellow sulphur again.

It may be observed, that the name *lac sulphuris*, or "milk of sulphur," applied among us to the precipitate, is by the French writers confined to the white liquor before the precipitate has fallen from it.

723. Volatile tincture of sulphur.

Take of flowers of sulphur, six ounces; sal ammoniac, one pound; quicklime, a pound and a half. Sprinkle some water on the lime; and, when flaked and fallen into powder, grind it first with the sulphur, and afterwards with the sal ammoniac, in small quantities at a time: then distil the mixture in a retort, with a fire gradually increased. The distilled liquor is to be kept, in a bottle close stopped, for use.

This liquor has a strong offensive smell: the vapour spreads to a considerable distance, changes silver or copper utensils to a brown or blackish colour, and produces disagreeable alterations in many medical preparations: to this circumstance, therefore, due regard ought to be had in the performance of that process, and in the keeping of this tincture. If a piece of paper, written upon with a saturated solution of lead in vegetable acids, and gently dried, be placed in the middle of a quire of paper, or of a pretty thick book, and brought near the unstopped orifice of the bottle containing this tincture, the vapour will quickly reach it, and change the colourless writing to a legible black.

Hoffman has a great opinion of the virtues of this preparation. He says, a mixture of one part of the tincture with three of spirit of wine, in a dose of 30 or 40 drops, proves a most powerful diaphoretic; and that a liquor composed of this and camphor, takes off the pain of the gout, by bathing the feet with it. This tincture may be a powerful medicine, but it is certainly a very unpleasant one.

SECT. X. Metallic Preparations.

§ 1. PREPARATIONS OF GOLD.

724. GOLD is the most ponderous and perfect of the metals: it abides fixed and unaltered in the strongest fire; and is not acted upon by alkaline, or any simple acid menstruum. It dissolves in aqua regia alone, into a yellowish transparent fluid: this solution stains the skin, &c. purple: the ethereal spirit of wine, and some essential oils, take up the gold from it: alkalies

precipitate the metal in form of a yellowish mud, which exiccated, and exposed to a small heat, violently explodes.

As to the medicinal virtues of this metal, experience has sufficiently shown, that it is not possessed of any valuable ones. In its metallic form, however finely comminuted, it proves inactive; when satiated with acid, corrosive; and in the intermediate states, either insignificant or unsafe.

725. Potable gold.

Dissolve with a moderate heat, half a dram of fine gold, in two ounces of aqua regia; and add to the solution one ounce of the essential oil of rosemary. Shake them together, and then suffer them to rest: the acid loses its gold yellow colour; and the oil, which arises to the surface, becomes richly impregnated therewith. Separate the oil by decantation, and add to it four or five ounces of rectified spirit of wine: digest this mixture for a month, and it will acquire a purplish colour.

There have been many preparations of this kind contrived by the designing pretenders to alchemy, and imposed upon the credulous and unwary, as cordials and diaphoretics of inestimable value. The above seems to be one of the best and safest of them; though it would be equally serviceable as a medicine, if made without the ingredient which it receives its name from. The gold is indeed taken up from the acid, and kept for a time dissolved by the oil; but on standing, it totally separates, in form of fine yellow films, like leaf-gold. The effect is the same, whether the oil or the vinous spirit be mixed with the solution of the gold in aqua regia: the only difference is, that the gold is thrown off from the oil to the sides of the glass; whilst the spirit revives it into such subtle films, as to float upon the surface of the liquor. No means have yet been found of permanently combining gold with either oils or vinous spirits.

§ 2. PREPARATIONS OF SILVER.

726. SILVER is the most permanent in the fire of all the metals after gold. It dissolves in the pure nitrous acid, into a colourless transparent liquor, intensely bitter and corrosive. This solution exiccated, furnishes the shops with an useful caustic; which has likewise been taken internally, in small doses, and mixed with other substances, as an hydragogue: it stains the skin black.

727. a. The lunar caustic. L.

Let pure silver be dissolved in about twice its weight of aquafortis, upon warm sand; then gently increase the heat, until a dry mass is left. Melt this in a crucible, that it may be poured into proper moulds, carefully avoiding overmuch heat, lest the matter should grow too thick.

727. b. The lunar caustic, or infernal stone. E.

Take four ounces of well-cupelled silver, flatted into plates, and cut in pieces. Dissolve it, by the heat of a sand-bath, in a mixture of eight ounces of weak spirit of nitre, and four ounces of water. Evaporate the solution to dryness, and put the remaining calx into a large crucible. Let the fire at first be gentle, and augment it by degrees, until the mass flows like oil, and ceases to fume: then pour it into

to iron pipes made for this purpose, previously heated and greased: lastly, let it be dried and kept for use in a glass vessel closely stoppered.

The crucible ought to be large enough to hold five or six times the quantity of the dry matter; for it bubbles and swells up greatly, so as otherwise to be apt to run over: during this time, also, little drops are now and then spirted up, whose causticity is increased by their heat, and which the operator ought therefore to be on his guard against. The fire must be kept moderate till this ebullition ceases, and till the matter becomes consistent in the heat that made it boil before: then quickly increase the fire till the matter flows thin at the bottom, like oil; on which it is to be immediately poured into the mould, without waiting till the fumes cease to appear; for when this happens, the preparation proves not only too thick to run freely into the mould, but likewise less corrosive than it is expected to be.

In want of a proper iron mould, one may be formed of tempered tobacco-pipe-clay, not too moist, by making in a lump of it, with a smooth stick first greased, as many holes as there is occasion for; pour the liquid matter into these cavities, and when congealed, take it out by breaking the mould. Each piece is to be wiped clean from the grease; and wrapt up in dry soft paper, not only to keep the air from acting upon them, but likewise to prevent their corroding or discolouring the fingers in handling.

This preparation is a strong caustic, and frequently employed as such for consuming warts and other fleshy excrescences, keeping down fungous flesh in wounds or ulcers, and other like uses. It is rarely applied where a deep eschar is required, as in the laying open of imposthumations and tumours; for the quantity necessary for these purposes, liquefying by the moisture of the skin, spreads beyond the limits in which it is intended to operate.

728. *The lunar pills.*

Dissolve pure silver in aquafortis; and after due evaporation, set the liquor to crystallize. Let the crystals be again dissolved in common water, and mingled with a solution of equal their weight of nitre. Evaporate this mixture to dryness, and continue the evaporation with a gentle heat, keeping the matter constantly stirring till no more fumes arise.

Here it is necessary to continue the fire till the fumes entirely cease, as more of the acid is required to be dissipated than in the preceding process. The preparation is, nevertheless, in taste very sharp, intensely bitter, and nauseous; applied to ulcers, it acts as a caustic, but much milder than the foregoing. Boerhaave, Boyle, and others, greatly commend it in hydropic cases. The former assures us, that two grains of it made into a pill, with a crumb of bread and a little sugar, and taken on an empty stomach, (some warm water, sweetened with honey, being drank immediately after), purge gently without griping, and bring away a large quantity of water, almost without the patient's perceiving it: that it kills worms, and cures many inveterate ulcerous disorders. He nevertheless cautions against using it too freely, or in too large a dose; and observes, that it always proves corrosive and weakening, especially to the stomach.

§. 3. PREPARATIONS OF IRON.

729. Iron calcines by fire the most easily, and melts the most difficultly of all the metals. Sulphur promotes its fusion, and changes it into a substance not greatly dissimilar to a combination of the metal with acid. All acids dissolve this metal; even the air corrodes it into a rust or calx.

Iron, in its metallic form, or lightly calcined, or combined with vegetable or with mineral acids, acts in the human body in the same manner (but with different degrees of power) by constringing the fibres. In all these states, it promotes or restrains secretions, where the deficiency or excess proceed from a laxity and debility of the vessels; and, in general, raises the pulse, and quickens the circulation. The calces seem to be the least active preparations; the crude metal duly comminuted, is more easily soluble in the animal fluids, and, if aescient juices are lodged in the primæ viæ, soon manifests its operation by noxious eructations, and the black colour of the alvine fæces; if previously combined with saline bodies, it scarce ever fails of taking effect.

735. As the calces of iron are scarcely dissoluble in acids, it has been concluded that they are not soluble in the human body, and that therefore they are to be looked upon no otherwise than as a mere inactive earth. But admitting the absolute indissolubility of iron while it continues a calx, it must be observed, that the calces of this metal are remarkably easy of revival into their metallic state. Mr Beaume relates, that calx of iron, digested for an hour or two in oil-olive, resumes its perfect metallic nature, so as to be attracted by the magnet, and totally soluble in acids; from whence he infers, that a like revival of the metal happens in the human body. It is matter of common observation, that calces of iron tinge the excrements black, a sure mark of their taking effect: though their effect appears to be neither so speedy nor so great as that of iron in some other forms.

730. *Rust of steel prepared.* L.

Expose filings of steel to the air, frequently moistening them with vinegar or water, until they change into rust: then grind them in a mortar; and, pouring on water, wash over the more subtle powder. The remainder is to be exposed afresh to the air, and moistened as at first; then triturated and washed again; and the powders that have been washed over, dried and kept for use.

The rust of iron is preferable as a medicine to the calces, or croci, made by a strong fire. Hoffman relates, that he has frequently given it with remarkable success in obstinate chlorotic cases, accompanied with excessive headachs and other violent symptoms; and that he usually joined it with pimperella, arum root, and salt of tartar, with a little cinnamon and sugar. The dose is from four or five grains to 20 or 30: some have gone as far as a dram; but all the preparations of this metal answer best in small doses, which should rather be often repeated than enlarged.

731. *Scales of iron prepared.* E.

The scales beat off from pieces of iron when hammered on the anvil are to be cleaned by a magnet; those which the magnet attracts being kept for use.

732. *Martial ethiops.*

Put filings of steel into an unglazed earthen vessel, with so much water as will stand above them about four inches; the whole is to be well stirred every day, and more water supplied as that in the vessel exhales, so that the filings may remain always covered: continue this procedure for several months, till they lose their metallic aspect, and are reduced to a fine powder of an inky blackness.

This preparation is described by Lemery in the memoirs of the French academy. But the tediousness of the process has prevented its coming into use; especially as it does not promise any advantage above the common chalybeate preparations, to counterbalance that inconvenience.

733. *Steel prepared with sulphur. L.*

Heat the steel with a very fierce fire to a strong white heat, and in this state apply it to a roll of sulphur held over a vessel of water: the steel will melt, and fall down in drops, which are to be picked out from the sulphur that runs down with them, and ground into an impalpable powder.

The shops have been generally supplied with a preparation of steel with sulphur made at an easier rate in the following manner.

734. *Sulphurated iron.*

Mix filings of iron with twice their weight of powdered sulphur, and as much water as is sufficient to make them into a paste; which on standing at rest for six hours, will swell up. The matter is then to be pulverized, put by degrees into a hot crucible to deslagrate, and kept continually stirring with an iron spatula till it falls into a deep black powder.

If the quantity of this mixture is considerable, and strongly pressed down, it will not only swell on standing for some hours, but will heave up very weighty obstacles, and burst out into flame.

735. *Opening crocus of iron.*

This is made by keeping the foregoing preparation longer over the fire, till it assumes a red colour.

736. *Astringent crocus of iron.*

This is made from the opening crocus of iron, by reverberating it for a long time in the most extreme degree of heat.

These preparations differ from one another in virtue; though the difference is not of such a kind as the titles they have been usually distinguished by import. All the preparations of steel act by an astringent quality; that above, denominated *astringent*, seems to have the least effect. They may be given in form of bolus, electuary, or pill, from six grains to a scruple.

In some foreign pharmacopœias, the croci of iron are prepared from pure green vitriol. This strongly calcined (or the colcothar remaining after the distillation of oil of vitriol), is the *astringent crocus*; when less calcined, it is called *aperient*. These preparations differ little, if at all, from those above distinguished by the same appellations: and accordingly the Edinburgh college has now allowed the substitution of colcothar of vitriol to both the croci.

737. *Soluble or tartarized steel. E.*

Mix equal parts of iron filings and crystals of tartar,

with as much water as is sufficient to reduce them into a mass: this mass is to be dried in a sand-heat; then powdered, moistened, and dried again; and this process repeated, till such time as the matter will easily grind into an impalpable powder.

This is a very elegant and useful preparation of steel. It may be given either in a liquid form, or in that of a bolus, &c. in doses of four five grains, or half a scruple. Dr Willis is said to have been the inventor of this preparation, and by his name it has been usually distinguished in the shops.

738. *Martial flowers. L.*

Take of colcothar of green vitriol washed, or filings of iron, one pound; sal ammoniac, two pounds. Mix and sublime in a retort. Grind the flowers with the matter which remains in the bottom of the retort, and repeat the sublimation until the flowers arise of a beautiful yellowish colour. To the residuum you may add half a pound of fresh sal ammoniac, and sublime as before; repeating this as long as the flowers arise well coloured.

This preparation is supposed to be highly aperient and attenuating; though no otherwise so than the rest of the chalybeates, or at most only by virtue of the saline matter joined to the iron. It has been found of good service in hysterical and hypochondriacal cases, and in distempers proceeding from a laxity and weakness of the solids, as the rickets. It may be conveniently taken in the form of a bolus, from two or three grains to ten: it is nauseous in a liquid form (unless in spirituous tincture), and occasions pills to swell and crumble except such as are made of the gums.

739. *Salt of steel. L.*

Take of strong spirit or oil of vitriol, eight ounces; iron filings, four ounces; water, two pints. Mix them together; and after the ebullition ceases, let the mixture stand for some time upon a warm sand; then pour off and filter the liquor; and after proper exhalation set it by to crystallize.

The salt of steel is one of the most efficacious preparations of this metal; and not unfrequently made use of in cachectic and chlorotic cases, for exciting the uterine purgations, strengthening the tone of the viscera, and destroying worms. It may be conveniently taken in a liquid form, largely diluted with aqueous fluids. Boerhaave directs it to be dissolved in an hundred times its quantity of water, and the solution to be taken in the dose of 12 ounces, on an empty stomach, walking gently after it; thus managed, he says, it opens the body, purges, proves diuretic, kills and expels worms, tinges the excrements black, or forms them into a matter like clay, strengthens the fibres, and thus cures many different distempers. The quantity of vitriol in the above dose of the solution is 57 grains and a half: but in common practice, such large doses of this strong chalybeate are never ventured on. Four or five grains, and in many cases half a grain, are sufficient for the intentions in which chalybeate medicines are given. Very dilute solutions, as that of a grain of the salt in a pint of water, may be used as succedanea to the natural chalybeate waters, and will in many cases produce similar effects.

§ 4. PREPARATIONS OF COPPER.

740. COPPER is less easy of solution than iron; and in its metallic state, does not appear to be acted on by the animal fluids, or to have any considerable effect in the body. Dissolved, it proves externally an escharotic; internally, a violent purgative and emetic. Acids of every kind dissolve it, and likewise volatile alkalies. With the vegetable and marine acids, it forms a green solution; with the vitriolic acid and volatile alkalies, a blue.

741. *Volatile tincture of copper.*

Take of copper filings, one dram; spirit of sal ammoniac, 12 drams. Let them stand together in a glass vessel, frequently shaking it, until the liquor is tinged of a beautiful violet colour.

This tincture, or solution, of copper has been given internally, in the dose of a few drops, as a diuretic. Boerhaave directs at first three drops to be taken in a morning fasting, with a glass of mead; and this dose to be daily doubled till it comes to 24 drops; which last quantity is to be continued for some days: he says, that by this means he cured an hydropic person labouring under a confirmed ascites, and that the medicine procured surprising discharges of urine; that nevertheless, on trying it in another case of the same kind, it did not answer.

742. *Ammoniacal copper. E.*

Take of blue vitriol, two ounces; dissolve it in six ounces of boiling water, gradually drop in as much spirit of sal ammoniac as will first precipitate, and then entirely dissolve the metal. Evaporate the liquor with a very gentle heat, and keep the blue saline mass in bottles well stoppered.

§ 5. PREPARATIONS OF LEAD.

743. LEAD readily melts in the fire, and calcines into a dusky powder; which, if the flame is reverberated on it, becomes at first yellow, then red, and at length melts into a vitreous mass. This metal dissolves easily in the nitrous acid, difficultly in the vitriolic, and in small quantity in the vegetable acids; it is also soluble in expressed oils, especially when calcined.

Lead and its calces, whilst undissolved, have no considerable effects as medicines. Dissolved in oils, they are supposed to be (when externally applied) anti-inflammatory and desiccative. Combined with vegetable acids, they are notably so; and taken internally, prove a powerful but dangerous styptic.

744. *Minium, or red lead.*

Let any quantity of lead be melted in an unglazed earthen vessel, and kept stirring with an iron spatula, till it falls into a powder, at first blackish, afterwards yellow, and at length of a deep red colour, in which last state it is called *minium*; taking care not to raise the fire so high as to run the calx into a vitreous mass.

These calces are employed in external applications, for abating inflammations, cleansing and healing ulcers, and the like. Their effects, however, are not very considerable; nor are they perhaps of much farther

real use, than as they give confidence to the plaster, unguent, &c.

745. *Cerusse, or white lead. E.*

Put some vinegar into the bottom of an earthen vessel, and suspend over the vinegar very thin plates of lead, in such a manner that the vapour which arises from the acid may circulate about the plates. Set the containing vessel in the heat of horse-dung, for three weeks: if at the end of this time the plates are not totally calcined, scrape off the white powder, and expose them again to the steam of vinegar, till all the lead is thus corroded into powder.

In this operation the lead is so far opened by the acid, as to discover, when taken internally, the malignant quality of the metal; and to prove externally, when sprinkled on running sores, or ulcers, moderately cooling, drying, and astringent.

746. *Sugar of lead.*

Boil cerusse with distilled vinegar in a leaden vessel, until the vinegar becomes sufficiently sweet; then filter the vinegar through paper, and after due evaporation set it to crystallize. L.

Put any quantity of cerusse into a cucurbit, and pour thereon distilled vinegar to the height of four inches. Digest them together for some days in a sand-heat, till the vinegar has acquired a sweetish taste; when it is to be suffered to settle, and then poured off. Add fresh vinegar to the remainder, and repeat this process till the menstruum no longer extracts any sweet taste. Let all the impregnated liquors rest for some time; and after they have been poured from the fæces, evaporate them in a glass vessel, to the consistence of thin honey; so that upon being set in a cool place, the sugar may shoot into crystals, which are afterwards to be dried in the shade. Exhale the remaining liquor to a pellicle, set it again in the cold, and more crystals will shoot; repeat this operation till no crystals can any longer be obtained. E.

The sugar of lead is much more efficacious than the foregoing preparations, in the several intentions which they are applied to. Some have ventured upon it internally, in doses of a few grains, as a styptic, in hæmorrhages, profuse colliquative sweats, seminal fluxes, the fluor albus, &c. nor has it failed their expectations. It very powerfully restrains the discharge; but almost as certainly as it does this, it occasions symptoms of another kind, often more dangerous than those removed by it, and sometimes fatal. Violent pains in the bowels or through the whole body, and obstinate constipations, sometimes immediately follow, especially if the dose has been considerable; cramps, tremors, and weakness of the nerves, generally, sooner or later ensue.

§ 6. PREPARATIONS OF TIN.

747. TIN easily melts in the fire, and calcines into a dusky powder, which by a farther continuance of the heat becomes white. A mass of tin heated till it is just ready to melt proves extremely brittle, so as to fall in pieces from a blow, and by dextrous agitation into powder. Its proper menstruum is aqua regia; though the other mineral acids also may be made to dissolve it, and the vegetable ones, in small quantity. It crystal-

lizes

lizes with the vegetable and vitriolic acids; but with the others, deliquesces.

The virtues of this metal are little known. It has been recommended as an antihysteric, antiseptic, &c. At present it is chiefly used as an anthelmintic.

748. Powdered tin. L.

Melt the tin, and pour it into a wooden box rubbed in the inside with chalk; then immediately let the box be nimbly shaken, and a part of the tin will fall into powder. The remainder is to be melted a second time, and treated in the same manner, till the whole of the metal is thus reduced into powder.

This preparation has been used for some time as a remedy against worms, particularly the flat kinds, which too often elude the force of other medicines. The general dose is from a scruple to a dram; some confine it to a few grains. But Dr Alston assures us, in the Edinburgh Essays, that its success chiefly depends upon its being given in much larger quantities: he gives an ounce of the powder on an empty stomach, mixed with four ounces of melasses; next day, half an ounce; and the day following, half an ounce more; after which, a cathartic is administered: he says the worms are usually voided during the operation of the purge, but that pains of the stomach occasioned by them are removed almost immediately upon taking the first dose of the tin.

§ 7. PREPARATIONS OF MERCURY.

749. MERCURY, or quicksilver, is a ponderous metallic fluid, totally volatile in a strong fire, and calculable by a weaker one (tho' very difficultly) into a red powdery substance. It dissolves in the nitrous acid, is corroded by the vitriolic, but not acted on by the marine in its liquid state: it nevertheless may be combined with this last, if skillfully applied in the form of fume. Quicksilver unites, by trituration, with earthy, unctuous, resinous, and other like substances, so as to lose its fluidity: triturated with sulphur, it forms a black mass, which by sublimation changes to a beautiful red one.

The general virtues of the mercurial preparations are, to fuse the juices, however viscid, in the minutest and remotest vessels; by this means they prove eminently serviceable in inveterate chronic disorders, proceeding from a thickness and sluggishness of the humours, and obstinate obstructions of the glands. Crude mercury has no effect this way. Resolved into fume, or divided into minute particles, and prevented from re-uniting by the interposition of other substances, it operates very powerfully; unless the dividing body be sulphur, which restrains its action. Combined with a small quantity of the mineral acids, it acts effectually, though in general mildly; with a larger, it proves violently corrosive.

750. Purification of quicksilver. L.

Distil quicksilver in a retort; and afterwards wash it with water and common salt, or with vinegar.

If a glass retort is made use of for this operation, it ought to have a low body, and a long neck; and the neck should be considerably inclined downwards, so as to allow the elevated mercury a quick descent: the receiver should be filled almost to the neck of the retort with water; the use of this is not to condense,

but to cool, the distilling quicksilver, lest falling hot upon the bottom it should crack the glass. The distillation may be more conveniently performed in an iron retort, or an iron pot fitted with a head.

The fire should be raised no higher than is sufficient to elevate the mercury; for certain mineral substances, which are said to be sometimes mixed with it, prove in part volatile in a degree of heat not much greater than that in which mercury distils. Mr Boyle relates, that he has known quicksilver carry up with it a portion even of lead, so as to have its weight very sensibly increased thereby; and this happened tho' only a moderate fire was used.

751. Sugared mercury.

Take pure quicksilver, brown sugar-candy, of each half an ounce. Essential oil of juniper-berries, 16 drops. Grind them together in a glass mortar, until the mercury ceases to appear.

The essential oil, here added, is said to be a very useful ingredient; not only promoting the extinction of the quicksilver (which, however, is still not a little difficult and tedious), but likewise improving the medicine. The intention is only to divide the mercury by the interposition of other bodies; for when thus managed, it has very powerful effects; tho' whilst undivided, it seems to be altogether inactive. Sugar alone apparently answers this intention; but on the commixture of aqueous fluids, the sugar dissolves by itself, leaving the mercury to run together again in its original form: the addition of the oil is said in great measure to prevent this inconvenience. The dose of this medicine, as an alterative, is from two or three grains to a scruple.

752. Ethiops mineral.

Take purified quicksilver, flowers of sulphur, un washed, of each equal weights. Grind them together in a glass or stone mortar, until they are united. L. Take of purified quicksilver, flowers of sulphur, each equal weights. Grind them together in a glass mortar, with a glass pestle, till the mercurial globules totally disappear. L.

An ethiops is made also with a double quantity of mercury.

The union of the mercury and sulphur might be greatly facilitated by the assistance of a little warmth. Some are accustomed to make this preparation in a very expeditious manner, by melting the sulphur in an iron ladle, then adding the quicksilver, and stirring them together till the mixture is completed. The small degree of heat here sufficient, cannot reasonably be supposed to do any injury to substances which have already undergone much greater fires, not only in the extraction from their ores, but likewise in the purifications of them directed in the pharmacopœia. In the following process, they are exposed in conjunction to a strong fire, without suspicion of the compound receiving any ill quality from it. Thus much is certain, that the ingredients are more perfectly united by heat, than by the degree of triture usually bestowed upon them. From the ethiops prepared by triture, part of the mercury is apt to be spued out on making it into an electuary or pills: from that made by fire, no separation is observed to happen.

Ethiops

Ethiops mineral is one of the most inactive of the mercurial preparations. Some practitioners have boldly asserted its posessing extraordinary virtues; and most people imagine it a medicine of some efficacy. But what benefit is to be expected from it in the common doses of eight or ten grains, or a scruple, may be judged from hence, that it has been taken in doses of several drams, and continued for a considerable time, without producing any remarkable effect. Sulphur eminently abates the power of all the more active minerals, and seems to be at the same time restrained by them from operating in the body itself. Boerhaave, who is in general sufficiently liberal in the commendation of medicines, disapproves the ethiops in very strong terms. "It cannot enter the absorbent vessels, the lacteals, or lymphatics; but passes directly through the intestinal tube, where it may happen to destroy worms, if it operates luckily. They are deceived who expect any other effects from it; at least I myself could never find them. I am afraid, it is unwarily given, in such large quantities, to children and persons of tender constitutions; as being a foreign mass, unconquerable by the body, the more to be suspected, as it continues long, sluggish, and inactive. It does not raise a salivation, because it cannot come into the blood. Who knows the effects of a substance, which, so long as it remains compounded, seems no more active than any insipid ponderous earth!" The ethiops with a double proportion of mercury, received into the former edition of the Edinburgh pharmacopoeia, has a greater chance for operating as a mercurial; and probably the quantity of mercury might be still further increased to advantage.

753. Artificial cinnabar. E.

Take of purified quicksilver, three pounds and a half; flowers of sulphur, washed, one pound. Melt the sulphur in a large iron vessel, over a gentle fire; and add to it by degrees the quicksilver previously heated, stirring them constantly together with an iron spatula that they may be perfectly mixed. Immediately fit upon the vessel a wooden cover, to prevent the mixture from taking fire: before the matter is grown cold, grind it into powder, and sublime according to art.

It has been customary to order a larger quantity of sulphur than here directed: but this smaller proportion answers better; for the less sulphur, the finer coloured is cinnabar.

The principal use of cinnabar is as a pigment. It was formerly held in great esteem as a medicine, in cutaneous foulnesses, gouty and rheumatic pains, epileptic cases, &c. but of late it has lost much of its reputation. It appears to be nearly similar to the *ethiops*, already spoken of. Cætheuser relates, that having given cinnabar in large quantities to a dog, it produced no sensible effect; but was partly voided along with the feces unaltered, and partly found entire in the stomach and intestines, upon opening the animal. The celebrated Frederick Hoffman, after bestowing high encomiums on this preparation, as having in many instances within his own knowledge perfectly cured epilepsies and vertiges from contusions of the head (where it is probable, however, that the cure did not so much depend upon the cinnabar, as on the spon-

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taneous recovery of the parts from the external injury) observes, that the large repeated doses, necessary for having any effect, can be borne only where the first passages are strong; and that if the fibres of the stomach and intestines are lax and flaccid, the cinnabar, accumulated and concentering with the mucous matter of the parts, occasions great oppression: Which seems to be an acknowledgment that the cinnabar is not subdued by the powers of digestion, and has no proper medicinal activity. There are indeed some instances of the daily use of cinnabar having brought on a salivation; perhaps from the cinnabar, made use of in those cases, having contained a less proportion of sulphur than the sorts commonly met with. The regulus of antimony, and even white arsenic, when combined with a certain quantity of common sulphur, seem to have their deleterious power destroyed: on separating more and more of the sulphur, they exert more and more of their proper virulence. It does not seem unreasonable to presume, that mercury may have its activity varied in like manner; that when perfectly satiated with sulphur, it may be inert; and that when the quantity of sulphur is more and more lessened, the compound may have greater and greater degrees of the proper efficacy of mercurials.

Cinnabar is sometimes used in fumigations against venereal ulcers in the nose, mouth, and throat. Half a dram of it burnt, the fume being imbibed with the breath, has occasioned a violent salivation. This effect is by no means owing to the medicine as cinnabar: when set on fire, it is no longer a mixture of mercury and sulphur; but mercury resolved into fume, and blended in part with the volatile vitriolic acid; in either of which circumstances, this mineral, as already observed, has very powerful effects.

754. Calcined mercury. L.

Put purified quicksilver into a broad-bottomed glass vessel, having a small hole open to the air, and keep it in a constant heat, in a sand-furnace, for several months, until it is calcined into a red powder.

This tedious process might, in all probability, be greatly expedited, by employing, instead of a vessel with a small aperture, a very wide-mouthed, flat-bottomed glass body, of such a height that the mercury may not escape: by this means, the air, which is essentially necessary to the calcination of all metallic substances, will be more freely admitted. A vessel might be so contrived, as to occasion a continual flux of air over the surface of the mercury.

This preparation is by some highly esteemed in venereal cases, and supposed to be the most efficacious and certain of all the mercurials. It may be advantageously given in conjunction with opiates; a bolus or pill, containing from half a grain to two grains of this calc, and a quarter or half a grain or more of opium, with the addition of some warm aromatic ingredient, may be taken every night. Thus managed, it acts mildly, though powerfully, as an alternative and diaphoretic: given by itself in larger doses, as four or five grains, it proves a rough emetic and cathartic.

755. Solution of mercury.

Take equal quantities of pure quicksilver, and good aqua-

aquafortis. Digest them together in a phial placed in a sand-furnace, that a limpid solution may be made.

Aquafortis dissolves mercury more easily, and in larger quantity, than any other acid: 16 ounces, if the menstruum is very strong and pure, will take up 11 or 12. As the liquor grows cold, a considerable part concretes, at the bottom of the vessel, into a crystalline form. If the whole is wanted to remain suspended, a proper quantity of water should be added after the solution is completed.

This process is given only as preparatory to some of the following ones. The solution is highly caustic, so as scarce to be safely touched. It stains the skin purple or black.

756. *Calx of mercury.*

Take any quantity of the solution of mercury, and evaporate it over a gentle fire, till a white dry mass remains.

This calx, or rather salt, of mercury, is violently corrosive. It is rarely made use of any otherwise than for making the following preparation and the corrosive sublimate.

757. *Red calx of mercury, commonly called red precipitate. E.*

Take any quantity of the calx of mercury, and reverberate it in a crucible with successive degrees of heat. Its white colour will change first into a brown, and afterwards a yellow; at length, upon increasing the fire, it passes into a deep red.

758. *The red mercurial corrosive. L.*

Take of purified quicksilver, compound aquafortis (A), of each equal weights. Mix, and set them in a broad-bottomed vessel, in a sand-heat, till all the humidity is exhale, and the mass has acquired a red colour.

The marine acid in the compound menstruum ordered in this last process, disposes the mercurial calx to assume the bright sparkling look admired in it; which, though perhaps no advantage to it as a medicine, ought nevertheless to be insisted on by the buyer as a mark of its goodness and strength. As soon as the matter has gained this appearance, it should be immediately removed from the fire, otherwise it will soon lose it again. The preparation of this *red precipitate*, as it is called, in perfection, is supposed by some to be a secret not known to our chemists; inasmuch that we are under a necessity of importing it from abroad. This reflection seems to be founded on misinformation: we sometimes indeed receive considerable quantities from Holland; but this depends upon the ingredients being commonly cheaper there than with us, and not upon any secret in the manner of the preparation.

This precipitate is, as its title imports, an escharotic; and in this intention is frequently employed by the surgeons, with basilicum, and other dressings, for consuming fungous flesh in ulcers, and the like purposes. It is subject to great uncertainty in point of strength; more or less of the acid exhaling, according to the degree and continuance of the fire. The best criterion of its strength, as already observed, is its

brilliant appearance; which is also the mark of its genuineness: if mixed with minium, which it is sometimes said to be, the duller hue will discover the abuse. This admixture may be more certainly detected by means of fire: the mercurial part will totally evaporate, leaving the minium behind.

Some have ventured to give this medicine internally, in venereal, scrophulous, and other obstinate chronic disorders, in doses of two or three grains and more. But certainly, the milder mercurials, properly managed, are capable of answering all that can be expected from this; without occasioning violent anxieties, tormina of the bowels, and other ill consequences, which the best management can scarcely prevent this corrosive preparation from sometimes doing.

759. *The white mercurial corrosive, or corrosive mercury sublimate.*

Take of purified quicksilver, forty ounces; sea-salt, thirty-three ounces; nitre, twenty-eight ounces; calcined green vitriol, sixty-six ounces. Grind the quicksilver, in a wooden or stone mortar, with an ounce or more of corrosive mercury sublimate already made, until the quicksilver is divided into small grains: this mixture is to be ground with the nitre, and afterwards with the sea-salt; then add the calcined vitriol, continuing the triture only for a little time longer, lest the quicksilver should run together again. Lastly, proceed to sublimation, in a glass matrafs; to which you may adapt a head, in order to save a little spirit that will come over. *L.*

Take of quicksilver, and weak spirit of nitre, of each four ounces; calcined sea-salt and calcined vitriol, of each five ounces; dissolve the quicksilver in the acid, and let the mixture be evaporated almost to dryness; then add the vitriol and sea-salt, and sublime the mixture in a proper vessel. *E.*

The sublimate made by this method is the same with the foregoing; but as the quantity of fixed matter is small, it difficultly assumes the form of a cake. It requires indeed some skill in the operator, to give it this appearance when either process is followed. When large quantities are made, this form may be easily obtained, by placing the matrafs no deeper in the sand than the surface of the matter contained in it; and removing a little of the sand from the sides of the glass, as soon as the flowers begin to appear in the neck; when the heat should likewise be somewhat lowered, and not at all raised during the whole process. The sublimation is known to be completed by the edges of the crystalline cake, which will form upon the surface of the caput mortuum, appearing smooth and even, and a little removed from it.

Sublimate is a most violent corrosive, presently corrupting and destroying all the parts of the body it touches. A solution of it in water, in the proportion of about a dram to a quart, is made use of for keeping down proud flesh, and cleansing foul ulcers; and a more dilute solution, as a cosmetic and for destroying cutaneous insects. But a great deal of caution is requisite even in these external uses of it.

Some have nevertheless ventured to give it internally, in the dose of one-tenth or one-eighth of a grain. Boerhaave relates, that if a grain of it be dissolved

(A) Compound aquafortis is made by distilling a pound of the common sort from a dram of sea-salt.

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tions.

solved in an ounce or more of water, and a dram of this solution, softened with syrup of violets, taken twice or thrice a day, it will perform wonders in many reputed incurable distempers; but he particularly cautions us not to venture upon it, unless the method of managing it is well known.

Sublimate dissolved in vinous spirits has of late been given internally in larger doses; from a quarter of a grain to half a grain. This method of using it was brought into vogue by baron Van Swieten at Vienna, particularly for venereal maladies; and several trials of it have been made in this kingdom also with success. Eight grains of the sublimate are dissolved in sixteen ounces of rectified spirit of wine or proof-spirit; the rectified spirit dissolves it more perfectly, and seems to make the medicine milder in its operation than the proof-spirit of the original prescription of Van Swieten. Of this solution, from one to two spoonfuls, that is, from half an ounce to an ounce, are given twice a day, and continued till all the symptoms are removed; observing to use a low diet, with plentiful dilution, otherwise the sublimate is apt to purge and gripe severely. It generally purges more or less at the beginning, but afterwards seems to operate chiefly by urine and perspiration.

Sublimate consists of mercury united with a large quantity of marine acid. There are two general methods of destroying its corrosive quality, and rendering it mild; combining with it so much fresh mercury as the acid is capable of taking up, and separating a part of the acid by means of alkaline salts, and the like. On the first principle, *dulcified mercury sublimate* is formed; on the latter, *white precipitate*.

760. *Dulcified mercury sublimate.*

Take of corrosive mercury sublimate, one pound; purified quicksilver, nine ounces. Having powdered the sublimate, add to it the quicksilver, and digest them together in a matras, with a gentle heat of sand, until they unite; then, increasing the heat, let the mixture be sublimed. The sublimed matter, freed from the acrimonious part at top and such mercurial globules as happen to appear distinct in it, is to be reduced into powder, and sublimed again; and this sublimation repeated six times. *L.*

Take of corrosive mercury sublimate, reduced to powder in a glass mortar, four ounces and a half; pure quicksilver, three ounces. Mix them well together, by long trituration in a glass or marble mortar, until the quicksilver ceases to appear; taking care to avoid the finer powder that flies off. Put the powder into an oblong phial, of such a size, that only one-third of it may be filled; and let the glass in a sand-furnace, so as that the sand may reach up to one half of its height. By degrees of fire successively applied, almost all the mercury will sublime, and adhere to the upper part of the vessel. The glass being then broken, and the red powder which is found in its bottom, with the whitish one that sticks about the neck, being thrown away, let the white mercury be sublimed again three or four times. *E.*

The trituration of corrosive sublimate with quicksilver is a very noxious operation: for it is almost im-

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possible, by any care, to prevent the lighter particles of the former from arising, so as to affect the operator's eyes and mouth. It is nevertheless of the utmost consequence, that the ingredients be perfectly united before the sublimation is begun; and this may be most commodiously effected by the digestion ordered by the first of the above processes. It is indeed still necessary to pulverize the sublimate, before the mercury is added to it: but this may be safely performed, with a little caution; especially if, during the pulverization, the matter be now and then sprinkled with a little spirit of wine; this addition does not at all impede the union of the ingredients, or prejudice the sublimation: it will be convenient not to close the top of the subliming vessel with a cap of paper at first (as is usually practised) but to defer this till the mixture begins to sublime, that the spirit may escape.

The rationale of this process deserves particular attention; and the more so, as a mistaken theory herein has been productive of several errors with regard to the operation of mercurials in general. It is supposed, that the *dulcification*, as it is called, of the *mercurius corrosivus*, is owing to the spicula or sharp points, on which its corrosiveness depends, being broken and worn off by the frequent sublimations. If this opinion was just, the corrosive would become mild, without any addition, barely by repeating the sublimation; but this is contrary to all experience. The abatement of the corrosive quality of the sublimate is entirely owing to the combination of so much fresh mercury with it as is capable of being united; and by whatever means this combination is effected, the preparation will be sufficiently dulcified. Triture and digestion promote the union of the two, whilst sublimation tends rather to disunite them. The prudent operator, therefore, will not be solicitous about separating such mercurial globules as appear distinct after the first sublimation; he will endeavour rather to combine them with the rest, by repeating the triture and digestion.

The college of Wirtemberg require their *mercurius dulcis* to be only twice sublimed, and the Augustan but once; and Neumann proposes making it directly by a single sublimation, from the ingredients which the corrosive sublimate is prepared from, by only taking the quicksilver in a larger proportion. If the medicine, made after either of these methods, should prove in any degree acrid, water, boiled on it for some time, will dissolve and separate that part in which its acrimony consists. The marks of the preparation being sufficiently dulcified, are, its being perfectly insipid to the taste, and indissoluble by long boiling in water. Whether the water, in which it has been boiled, has taken up any part of it, may be known by dropping into the liquor a ley of any fixed alkaline salt, or any volatile alkaline spirit: if the decoction has any mercurial impregnation, it will grow turbid on this addition; if otherwise, it will continue limpid. But here care must be taken not to be deceived by an extraneous saline matter in the water itself: most of the common spring waters turn milky on the addition of alkalies; and therefore, for experiments of this kind, distilled water, or rain water, ought to be used.

Mercurius dulcis, seven times sublimed, has been commonly called *calomelas*, and *aquila alba*; names which are now dropped both by the London and Edinburgh colleges. *Calomelas* is indeed a very improper appellation, the word implying a black colour: by grinding *mercurius dulcis* with volatile spirits, it becomes blackish; and this perhaps is the true calomel.

Mercurius dulcis appears to be one of the best and safest preparations of this mineral for general use, whether intended to act as a salagogue, diaphoretic, or alterant. Many of the more elaborate processes are no other than attempts to produce from mercury such a medicine as this really is. The dose, for raising a salivation, is ten or fifteen grains, taken in the form of a bolus or pills, every night or oftener, till the ptyalism begins. As an alterant and diaphoretic, it is given in doses of five or six grains; a purgative being occasionally interposed, to prevent its affecting the mouth. It answers, however, much better when given in smaller quantities, as one, two, or three grains every morning and evening, in conjunction with such substances as determine its action to the skin, as the extract or resin of guaiacum; the patient at the same time keeping warm, and drinking liberally of warm diluent liquors. By this method of managing it, obdurate cutaneous and venereal distempers have been successfully cured, without any remarkable increase of the sensible evacuations.

761. *White precipitate of mercury.*

Dissolve sublimate corrosive mercury in a sufficient quantity of hot water, and gradually drop into the solution some spirit of sal ammoniac, as long as any precipitation ensues. Wash the precipitated powder upon a filter, with several fresh quantities of warm water. *E.*

This preparation is used chiefly in ointments, in which intention its fine white colour is no small recommendation to it.

Take sublimate corrosive mercury, sal ammoniac, of each equal weights. Dissolve them both together in water; filter the solution, and precipitate it with a solution of any fixed alkaline salt. Wash the precipitated powder till it is perfectly sweet, (that is, insipid or void of acrimony.) *L.*

Here the sal ammoniac, besides its use in the capital intention, that of furnishing a volatile alkali; to make a white precipitation, promotes the solution of the sublimate; which of itself is difficultly and scarce at all totally soluble by repeated boiling in water; for however skillfully it is prepared, some part of it will have an under proportion of acid, and consequently approach to the state of *mercurius dulcis*. A good deal of care is requisite in the precipitation; for, if too large a quantity of the fixed alkaline solution be imprudently added, the precipitate will lose the elegant white colour for which it is valued.

A precipitate of a different nature from the preceding has been commonly distinguished by the same name *mercurius precipitatus albus*. But it is a preparation very rarely made use of among us; notwithstanding the character given of it by Boerhaave, of being “perhaps the best remedy hitherto afforded by mer-

cury.” Mercury dulcis produces the good effects which this is supposed to do with a greater degree of certainty, and without disordering the constitution, occasioning vomiting, &c. which this precipitate, in a dose of two or three grains, frequently does.

762. *The yellow mercurial emetic. L.*

Upon purified quicksilver, contained in a glass vessel, pour double its weight of the strong spirit or oil of vitriol. Heat the liquor by degrees, so as at length to make it boil, till a white mass remains, which is to be thoroughly dried with a strong fire. This mass on the addition of warm water grows yellowish, and falls into powder, which is to be diligently ground with the water in a glass mortar: then suffer it to settle, pour off the water, and wash the powder in several parcels of fresh water, until it is sufficiently dulcified.

763. *Yellow precipitate of mercury, or turbith mineral. E.*

Take four ounces of pure quicksilver, and eight ounces of oil of vitriol. Cautionally mix them together; and distil, in a retort placed in a sand-furnace, to dryness; the white calx which is left at the bottom being ground to powder, and thrown into warm water, immediately grows of a yellow colour: wash this in fresh waters renewed several times, until it has lost all its acrimony; then dry it for use.

Boerhaave directs this preparation to be made in an open glass slowly heated, and then placed immediately upon burning coals; care being taken to avoid the fumes, which are extremely noxious. This method will succeed very well with a little address, when the ingredients are in small quantity: but where the mixture is large, it is better to use a retort, placed in a sand-furnace, with a recipient, containing a small quantity of water, luted to it. Great care should be taken, when the oil of vitriol begins to bubble, to steadily keep up the heat, without at all increasing it, till the ebullition ceases, when the fire should be augmented to the utmost degree, that as much as possible of the redundant acid may be expelled.

If the matter be but barely exhausted, it proves a caustic salt, which in the ablation with water will almost dissolve, leaving only a little quantity of turbith: the more of the acid has been dissipated, the less of the remaining mercury will dissolve, and consequently the yield of turbith will be the greater; fire expelling only the acid, (*viz.* such parts of the acid as are not completely satiated with mercury), while water takes up always along with the acid, a proportionable quantity of the mercury itself. Even when the matter has been strongly calcined, a part will still be soluble: this evidently appears upon pouring into the washings a little solution of fixed alkaline salt, which will throw down a considerable quantity of yellow precipitate, greatly resembling the turbith, except that it is less violent in operation.

From this experiment it appears, that the best method of edulcorating this powder is, by impregnating the water intended to be used in its ablation, with a determined proportion of fixed alkaline salt; for by this means the washed turbith will not only turn out greater in quantity, but, what is of more consequence, always

always have an equal degree of strength; a circumstance which deserves particularly to be considered, especially in making such preparations as, from an error in the process, may prove too violently corrosive to be used with any degree of safety.

Turbith mineral is a strong emetic, and in this intention operates the most powerfully of all the mercurials that can be safely given internally. Its action however is not confined to the primæ viæ; it will sometimes excite a pyralism, if a purgative is not taken soon after it. This medicine is used chiefly in virulent gonorrhæas, and other venereal cases where there is a great flux of humours to the parts: it is said likewise to have been employed with good success in robust constitutions, against leprous disorders, and obstinate glandular obstructions: the dose is from two grains to six or eight. It may be given in doses of a grain or two as an alternative and diaphoretic, after the same manner as the red precipitate.

This medicine has been of late recommended as the most effectual preservative against the hydrophobia. There are several examples of its preventing madness in dogs that had been bitten; and some, of its performing a cure after the madness was begun: from six or seven grains to a scruple may be given every day, or every other day, for a little time, and repeated at the two or three succeeding fulls and changes of the moon. Some few trials have likewise been made on human subjects bitten by mad dogs; and in these also the turbith, used either as an emetic or alternative, seemed in some cases to have good effects. See MEDICINE, n^o 425.

§ 8. PREPARATIONS of ANTIMONY.

764. ANTIMONY is composed of a metal united with sulphur or common brimstone.

If powdered antimony be exposed to a gentle fire, the sulphur exhales; the metallic part remaining in form of a white calx, reducible by proper fluxes into a whitish brittle metal, called *regulus*. This is readily distinguished from the other bodies of that class, by its not being soluble in aquafortis; its proper menstruum is aqua regis.

If aqua regis be poured upon crude antimony, the metallic part will be dissolved, and the sulphur thrown out, partly to the sides of the vessel, and partly to the surface of the liquor, in form of a greyish yellow substance. This, separated and purified by sublimation, appears on all trials the same with pure common brimstone.

The metal, freed from the sulphur naturally blended with it, and afterwards fused with common brimstone, resumes the appearance and qualities of crude antimony.

765. The antimonial metal is a medicine of the greatest power of any known substance: a quantity too minute to be sensible on the tenderest balance, is capable of producing virulent effects, if taken dissolved or in a soluble state. If given in such a form as to be immediately miscible with the animal fluids, it proves violently emetic; if so managed as to be more slowly acted on, cathartic; and in either case, if the dose is extremely small, diaphoretic. Thus, though vegetable acids extract so little from this metal, that the remainder seems to have lost nothing of its weight, the tinctures

prove in no large doses strongly emetic, and in smaller ones powerfully diaphoretic. The regulus has been cast into the form of pills, which acted as virulent cathartics, though without suffering any sensible diminution of weight in their passage through the body; and this repeatedly, for a great number of times.

This metal, divested of the inflammable principle which it has in common with other metallic bodies, that is, reduced to a calx, becomes indissoluble and inactive. The calx nevertheless, urged with a strong fire, melts into a glass, as easy of solution (partially), and as virulent in operation, as the regulus itself: the glass thoroughly mingled with such substances as prevent its solubility, as wax, resins, and the like, is again rendered mild.

766. Vegetable acids, as already observed, dissolve but an extremely minute portion of this metal; the solution nevertheless proves powerfully emetic and cathartic. The nitrous and vitriolic acids only corrode it into a powder, to which they adhere so slightly as to be separable in good measure by water, and totally by fire, leaving the regulus in form of a calx similar to that prepared by fire alone. The marine acid has a very different effect: this reduces the regulus into a violent corrosive, and tho' it difficultly unites, yet very closely adheres to it, inasmuch as not to be separable by any ablation, nor by fire, the regulus arising along with it. The nitrous or vitriolic acids expel the marine, and thus reduce the corrosive into a calx similar to the foregoing.

767. Sulphur remarkably abates the power of this metal: and hence crude antimony (in which the regulus appears to be combined with from one-fourth to one half its weight of sulphur) proves altogether mild. If a part of the sulphur be taken away by such operations as do not destroy or calcine the metal, the remaining mass becomes proportionably more active.

The sulphur of antimony may be expelled by deflagration with nitre: the larger the quantity of nitre, to a certain point, the more of the sulphur will be diffused, and the preparation will be the more active. If the quantity of nitre is more than sufficient to consume the sulphur, the rest of it deflagrating with the inflammable principle of the regulus itself, renders it again mild.

The sulphur of antimony is likewise absorbed, in fusion, by certain metals, and by alkaline salts. These last, when united with sulphur, prove a menstruum for all the metals, (zinc excepted), and hence, if the fusion is long continued, the regulus is taken up and rendered soluble in water.

768. *Crocus of antimony, commonly called Crocus metal-lorum, and by foreign writers: Hepar antimonii or liver of antimony.*

Take antimony, nitre, of each equal weights. Reduce them separately into powder; then mix, and inject them into a crucible heated to a white heat, that the mixture (after deflagration) may melt. Then pour it out, separate the scoria, and reserve the matter underneath them for use: it proves different in colour, according to the continuance of the heat: the longer it has been kept in fusion, the yellower it will be. *L.*

The mixture of antimony and nitre, made as above,

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tions.

is to be injected into a red-hot crucible; when the detonation is over, separate the reddish metallic matter from the whitish crust, and edulcorate it by repeated washings with hot water. *E.*

Here the antimonial sulphur is almost totally consumed, and the metallic part left divested of its corrector. These preparations, given from two to six grains, act as violent emetics, greatly disordering the constitution. Their principal use is in maniacal cases, as the basis of some other preparations; and among the farriers, who frequently give to horses an ounce or two a-day, divided into different doses, as an alterative: in these and other quadrupeds, this medicine acts chiefly as a diaphoretic.

769. *Washed crocus of antimony. L.*

Reduce the crocus into a very subtile powder, and boil it in the water; then, throwing away this water, wash the powder several times in fresh warm water, until it becomes perfectly insipid.

This process is designed chiefly to fit the crocus for the preparation of emetic tartar, of which hereafter, and of the antimonial emetic wine. If the crocus was employed for those purposes without washing, the alkaline sale, which it is in some degree impregnated with from the deslagration of the nitre, would in part satiate the acids of the tartar and of the wine, and thus, impeding their action on the metallic part of the antimony, render the medicines very precarious in strength: that uncertainties of this kind may be the more effectually guarded against, the glass, or rather the pure regulus, of antimony, is by some preferred to the crocus, both for the emetic tartar and wine.

770. *Medicinal regulus of antimony. E.*

Take of antimony, five ounces; sea-salt, four ounces; salt of tartar, one ounce. Grind them into powder; and throw the mixture, by little at a time, into a red-hot crucible; occasionally breaking, with an iron rod, the crust that forms on the surface. When the fusion is completed, pour out the matter into a heated cone, gently shaking it now and then, or striking it on the sides, that the regulus may settle to the bottom: when grown cold, beat off the scorize, and grind the regulus into a powder, which is to be kept in a close-stopped vial.

This preparation is greatly celebrated by Hoffman, and other German physicians, in sundry obdurate chronic disorders, and esteemed one of the best antimonials that can be given with safety as alterants: it operates chiefly as a diaphoretic, and sometimes, tho' rarely, emetic. The dose is from three or four grains to 20.

This regulus, reduced into a subtile powder, is the genuine *sebrifuge powder* of Craanius (*Pharm. Boruss. Brandenburg.* edit. 1734. p. 107.), and has been greatly commended in all kinds of fevers both of the intermittent and continual kind (*Pharm. Argent.* 1725. p. 252.) It is said that a dose or two have frequently removed these disorders, by occasioning either a salutary diaphoresis, or acting mildly by stool or vomit.

771. *Simple regulus of antimony.*

The most advantageous process for obtaining this regulus appears to be the following.

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tions.

Let powdered antimony be calcined or roasted over a gentle fire, as directed hereafter for making the glass. Mix the calx with about equal its weight of some reducing flux, such as the black flux. Melt the mixture in a crucible, with a quick fire, and when in thin fusion pour it into a cone heated over a smoky flame: the pure regulus will fall to the bottom, the scorize floating on the top.

772. *Precipitated sulphur of antimony. L.*

Take of antimony, 16 ounces; tartar, a pound; nitre, half a pound. Let these be reduced separately into powder; then mixed, thrown by degrees into a red-hot crucible, and melted with a strong fire. Pour out the matter into a conical mould; the metallic part, commonly called *regulus of antimony*, will sink to the bottom, the scorize swimming about it. Dissolve these scorize in water, filter the solution through paper, and precipitate the sulphur by dropping in some spirit of sea-salt: lastly, wash the sulphur from the salts, and dry it for use.

773. *Golden sulphur of antimony. E.*

Boil in an iron pot, four pints of soap-leys diluted with three pints of water, and throw in by degrees two pounds of powdered antimony; keeping them continually stirring, with an iron spatula, for three hours, over a gentle fire; and occasionally supplying more water. The liquor, loaded with the sulphur of antimony, being then strained through a double linen cloth, drop into it gradually, whilst it continues hot, so much spirit of nitre, diluted with an equal quantity of water, as shall be sufficient to precipitate the sulphur, which is afterwards to be carefully washed with hot water.

The foregoing preparations prove emetic when taken on an empty stomach, in a dose of four, five, or six grains: but in the present practice, they are scarce ever prescribed in this intention; being chiefly used as alterative deobstruents, particularly in cutaneous disorders. Their emetic quality is easily blunted, by making them up into pills with resins or extracts, and giving them on a full stomach: with these cautions, they have been increased to the rate of 16 grains a-day, and continued for a considerable time, without occasioning any disturbance upwards or downwards. As their strength is precarious, they should be taken at first in very small doses, and increased by degrees according to their effect.

A composition of the golden sulphur with *mercurius dulcis*, has been a powerful, yet safe, alterative in cutaneous disorders; and has completed a cure after salivation had failed; in venereal cases likewise, this medicine has produced excellent effects. A mixture of equal parts of the sulphur and calomel (well triturated together, and made into pills with extracts, &c.) may be taken from four to eight or ten grains, morning and night; the patient keeping moderately warm, and drinking after each dose a draught of a decoction of the woods or other like liquors. This medicine generally promotes perspiration, scarce occasioning any tendency to vomit or purge, or affecting the mouth. See the *Edinburgh essays*, vol. ii. and the *Asia natur. curios.* vol. v.

773—789. *Kermes mineral.* See *KERMES (Mineral)*, in the order of the alphabet.

790. *Panacea of antimony.*

Take of antimony, six ounces; nitre, two ounces; common salt, an ounce and a half; charcoal, an ounce. Reduce them into a fine powder, and put the mixture into a red-hot crucible, by half a spoonful at a time, continuing the fire a quarter of an hour after the last injection: then either pour the matter into a cone, or let it cool in the crucible, which when cold must be broken to get it out. In the bottom will be found a quantity of regulus; above this a compact liver-coloured substance; and on the top, a more spongy mass: this last is to be reduced into powder, edulcorated with water, and dried, when it appears of a fine golden colour.

This preparation is supposed to have been the basis of *Lockyer's pills*, which were formerly a celebrated purge. Ten grains of the powder mixed with an ounce of white sugar-candy, and made up into a mass with mucilage of gum tragacanth, may be divided into an hundred small pills; of which one, two, or three, taken at a time, are said to work gently by stool and vomit.

791. *Glass of antimony. E.*

Take of antimony reduced to powder, one pound. Calcine it over a gentle fire, in an unglazed earthen vessel, keeping it continually stirring with an iron spatula, until the fumes cease, even when the matter is red-hot. Melt the calx in a crucible, with an intense fire, and pour out the liquid matter into a heated brass dish.

The calcination of antimony, to fit it for making a transparent glass, succeeds very slowly, unless the operator be very wary and circumspect in the management of it. The most convenient vessel is a broad shallow dish, or a smooth flat tile, placed under a chimney. The antimony should be of the purer sort, such as is usually found at the apex of the cones: this, grossly powdered, is to be evenly spread over the bottom of the pan, so as not to lie above a quarter of an inch thick on any part. The fire should be at first no greater than is just sufficient to raise a fume from the antimony, which is to be now and then stirred: when the fumes begin to decay, increase the heat, taking care not to raise it so high as to melt the antimony, or run the powder into lumps: after some time the vessel may be made red-hot, and kept in this state until the matter will not, upon being stirred, any longer fume. If this part of the process be duly conducted, the antimony will appear in an uniform powder, without any lumps, and of a grey colour.

With this powder, fill two-thirds of a crucible, which is to be covered with a tile, and placed in a wind-furnace. Gradually increase the fire, till the calx is in perfect fusion, when it is to be now and then examined by dipping a clean iron wire into it: if the matter, which adheres to the end of the wire, appears smooth and equally transparent, the vitrification is completed, and the glass may be poured out upon a hot smooth stone or copper plate, and suffered to cool by slow degrees to prevent its cracking and flying in pieces. It is of a transparent yellowish-red colour.

The calcined antimony is said by Boerhaave to be

violently emetic. Experience has shown that the glass is so, inasmuch as to be unsafe for internal use. It is employed chiefly, in the present practice, as being subservient to some other preparations, particularly the emetic tartar and antimonial wine; and in combination with wax, and some other substances, by which its power is obtunded.

792. *Cerated glass of antimony. E.*

Take of yellow wax, a dram; glass of antimony, reduced into powder, an ounce. Melt the wax in an iron vessel, and throw into it the powdered glass: keep the mixture over a gentle fire for half an hour, continually stirring it; then pour it out upon a paper, and when cold grind it into powder.

The glass melts in the wax, with a very soft heat: after it has been about 20 minutes on the fire, it begins to change its colour, and in 10 more comes near to that of Scotch snuff, which is a mark of its being sufficiently prepared: the quantity set down above, loses about one dram of its weight in the process.

This medicine has for some time been greatly esteemed in dysenteries: several instances of its good effects in these cases may be seen in the fifth volume of the Edinburgh essays, from which the above remarks on the preparation are taken. The dose is from two or three grains to twenty, according to the age and strength of the patient. In its operation, it makes some persons sick and vomit; it purges almost every one; though it has sometimes effected a cure without occasioning any evacuation or sickness.

793. *The antimonial caustic. L. E.*

Take of crude antimony, one pound; corrosive mercury sublimate, two pounds. Reduce them separately into powder; then mix, and distil them in a wide-necked retort, with a gentle sand-heat. The matter which arises into the neck of the retort is to be exposed to the air, that it may run into a liquor.

This is intended for consuming fungous flesh and the callous lips of ulcers.

794. *Cinnabar of antimony.*

Is composed of the sulphur of the antimony, and the mercury of the sublimate, which are perfectly the same with the common brimstone and quicksilver, of which the artificial cinnabar is made. The antimonial cinnabar therefore, whose ingredients are laboriously extracted from other substances, is not different from the common cinnabar made with the same materials procured at a much cheaper rate.

795. *Emetic tartar.*

Take of washed crocus of antimony, crystals of tartar, each half a pound; water, three pints. Boil them together for half an hour; then filter the liquor, and after due evaporation set it by to crystallise. *L.*

Take of powdered cream of tartar, four ounces; levigated glass of antimony, six ounces. Mix, and throw them by little and little into a gallon of water boiling in a glass vessel set in a sand-heat. Let the whole boil gently for six hours; constantly supplying the water consumed by evaporation; then let the liquor be strained when cold, and evaporated

to a proper pitch that crystals may be formed. Tartar emetic may be made after the same manner from crocus metallorum, provided this has been properly prepared, which is known by its being of a yellow colour when powdered. *E.*

The title of this medicine expresses its principal operation. It is one of the best of the antimonial emetics, acting more powerfully than the quantity of crocus contained in it would do by itself, though it does not so much ruffle the constitution.

The dose of emetic tartar, when designed to produce the full effect of an emetic, is from four to six or eight grains. It may likewise be advantageously given in smaller doses, half a grain, for instance, as a diaphoretic and alterative in cutaneous disorders; and added in the quantity of a grain as a stimulus to ipecacuanha, &c.

§ 9. PREPARATIONS OF BISMUTH.

796. This metal resembles in appearance the regulus of antimony, but differs greatly from it in its pharmaceutical properties and medical qualities. It melts in a very small heat long before ignition; and totally dissolves, with great effervescence, in aquafortis, which only corrodes the antimonial metal. As a medicine, it seems, when pure, to have little or no effect; though some preparations of it were formerly accounted diaphoretic. At present only one preparation comes under the notice of the apothecary or chemist, and that designed for external use.

797. *Magistery of bismuth.*

Dissolve bismuth in a proper quantity of aquafortis, without heat, adding the bismuth by little and little at a time. Pour the solution into sixteen times its quantity of fair water: it will grow milky, and on standing for some time, deposit a bright white precipitate: the addition of spirit of wine will expedite the precipitation. Wash the powder in fresh parcels of water, and dry it in a shady place betwixt two papers.

This preparation is of some esteem as a cosmetic, which is the only use it is now applied to.

§ 10. PREPARATIONS OF ZINC.

798. This metal melts in a red heat; and, if the air is admitted, flames, and sublimates into light, white, downy flowers: if the air is excluded, it arises by a strong fire in its metallic form. Sulphur, which unites with or scorifies all the other metals except gold, does not act on zinc. Acids of every kind dissolve it.

Zinc, its flowers or calces, and solutions, taken internally, prove strong and quick emetics; in small doses, they are said to be diaphoretic. Externally, they are cooling, astrigent, and desiccative.

799. *Purification of zinc.*

Melt zinc with a heat no greater than is just sufficient to keep it fluid. Stir it strongly with an iron rod; and throw in alternately pieces of sulphur and of tallow, the first in largest quantity. If any consistent matter or scoria forms on the top, take it off, and continue the process until the sulphur is found to burn freely and totally away on the surface of the fluid zinc.

Zinc usually contains a portion of lead, which this process effectually separates. Sulphur united with lead forms a mass, which does not melt in any degree of fire that zinc is capable of sustaining.

800. *Flowers of zinc.*

Let a large and very deep crucible, or other deep earthen vessel, be placed in a furnace, in an inclined situation, only half upright. Put a small quantity of zinc into the bottom of the vessel, and apply a moderate fire, no greater than is necessary to make the zinc flame; white flowers will arise, and adhere about the sides of the vessel like wool. When the zinc ceases to flame, stir it with an iron rod, and continue this operation till the whole is sublimed.

These flowers should seem preferable for medicinal purposes, to tutty, and the more impure sublimes of zinc which are obtained in the brass-works; and likewise to calamine, the natural ore of this metal, which contains a large quantity of earth, and frequently a portion of heterogeneous metallic matter.

801. *Salt or vitriol of zinc.*

Dissolve purified zinc by a gentle heat of sand in a mixture of one part of oil of vitriol and four of water. Filter the solution; and after due evaporation, set it to crystallize.

This salt is an elegant white vitriol. It differs from the common white vitriol and the *sal vitrioli* of the shops, only in being purer, and perfectly free from any admixture of copper, or such other foreign metallic bodies as the others generally contain.

§ 11. COMPOUND METALLIC PREPARATIONS.

802. *The medicinal stone.*

Take of litharge, bole armenic, or French bole, alum, each half a pound; colcothar of green vitriol, three ounces; vinegar, a quarter of a pint. Mix and dry them till they grow hard.

This preparation is employed externally as an astrigent for loosening loose teeth, preserving the gums, healing and drying up ulcers and wounds, and repressing defluxions of thin acrid humours upon the eyes. It is sometimes used in injections for checking a gonorrhoea, after the virulence is expelled.

803. *An astrigent preparation taken from Maest, which has been sold under the name of Colbatch's styptic powder.*

Take any quantity of iron filings, and as much spirit of salt as will rise above them three or four inches. Digest them together with a gentle heat till the spirit ceases to act on the metal; then pour off the liquor, evaporate it to one half, and add thereto an equal weight of sugar of lead. Continue the evaporation with a small heat, until the matter remains dry, and assumes a red colour. If the process is stopped as soon as it becomes dry, it has exactly the appearance of Colbatch's powder. It must be kept close from the air, otherwise it deliquesces.

This is said to be the styptic with which so much noise was made some time ago, by the author of the *Novum lumen chirurgiae*, and for the sale of which a patent was procured: only in that was used oil of vitriol, instead of the spirit of salt in this; a difference

not very material. The preparation stands recommended in all kinds of hæmorrhages and immoderate fluxes, both internally and externally: the dose is from four grains to twelve. It is undoubtedly an efficacious styptic, but for internal use a dangerous one.

804. *Antimonial ethiops.*

Let equal quantities of antimony and sea-salt be melted together in a crucible for an hour: when grown cold, a regulus (improperly so called) will be found in the bottom; which is to be separated from the scorize that lie above it, and ground with an equal weight of purified quicksilver until they are united.

This medicine is said to be of remarkable efficacy in venereal cases of long standing, in cancerous tumours, scorbutic and scrophulous disorders, obstinate glandular obstructions, and sundry other chronic dilemperers which elude the force of the common medicines. A few grains may be given at first, and the dose gradually increased, according to its operation, to a scruple or more. It acts chiefly by promoting perspiration: in some constitutions it proves purgative; and in others, if the dose is considerable, emetic.

C H A P. II.

Medicinal COMPOSITIONS.

SECT. I. *Powders.*

805. THIS form receives such materials only as are capable of being sufficiently dried to become pulverable, without the loss of their virtue. There are many substances, however, of this kind, which cannot be conveniently taken in powder: bitter, acrid, fetid drugs, are too disagreeable: emollient and mucilaginous herbs and roots are too bulky; pure gums cohere, and become tenacious in the mouth; fixed alkaline salts liquefy upon exposing the composition to the air; and volatile alkalies exhale.

The dose of powders, in extemporaneous prescription, is generally about half a dram; it rarely exceeds a whole dram, and is not often less than a scruple. Substances which produce powerful effects in smaller doses are not trusted to this form, unless their bulk is increased by additions of less efficacy: those which require to be given in larger ones, are better fitted for other forms.

The usual vehicle for taking the lighter powders in, is any agreeable thin liquid. The ponderous powders, particularly those prepared from metallic substances, require a more consistent vehicle, as syrups; for from thin ones they soon subside. Resinous substances likewise are most commodiously taken in thick liquors: in thin ones, they are apt to run into lumps, which are not easily again dissoluble.

806. *General rules for making powders.*

I. Particular care ought to be taken that nothing carious, decayed, or impure, be mixed in the composition of powders: the stalks and corrupted parts of plants are to be separated.

II. The dry aromatics ought to be sprinkled, during

their pulverization, with a few drops of any proper water.

III. The moister aromatics may be dried with a very gentle heat before they are committed to the mortar.

IV. Gums, and such other substances as are difficultly pulverable, should be pounded along with the drier ones, that they may pass the sieve together.

V. No part should be separated for use until the whole quantity put into the mortar has passed the sieve, and the several siftings be mixed together; for those parts of one and the same subject which powder first, may prove different, at least in degree of efficacy, from the rest.

VI. Powders of aromatics are to be prepared only in small quantities at a time, and kept in glass vessels very closely stoppered.

If powders are long kept, and not carefully secured from the air, their virtue is in great measure destroyed, although the parts in which it consists should not in other circumstances prove volatile. Thus, though the virtues of ipecacoea are so fixed as to remain entire even in extracts made with proper menstrua, yet if the powdered root be exposed for a length of time to the air, it loses its emetic quality.

807. *Pulvis Antilyssur, or Powder against the bite of a mad dog.* L. E.

Take of ash-coloured ground-liverwort, two ounces; black pepper, one ounce. Beat them together into a powder.

The virtue which this medicine has been celebrated for, is expressed in its title: the dose is a dram and a half, to be taken in the morning fasting in half a pint of cows milk warm, for four mornings together.

808. *Compound powder of arum.* L.

Take of arum-root, fresh dried, two ounces; yellow water-flag roots, burnet faxifrage-roots, each one ounce; crabs-eyes prepared, cinnamon, each half an ounce; salt of wormwood, two drams. Beat them into a powder, which is to be kept in a close vessel.

The compound powder of arum was originally intended as the stomachic; and in weaknesses and relaxations of the stomach, accompanied with a surcharge of viscid humours, it is doubtless a very useful medicine. It frequently also has good effects in rheumatic cases. The dose may be from a scruple to a dram, two or three times a-day, in any convenient liquor. It should be used as fresh as possible, for its virtue suffers greatly in keeping.

809. *Compound powder of bole without opium.*

Take of bole armenic, or French bole, half a pound; cinnamon, four ounces; tormentil root, gum arabic, each three ounces; long pepper, half an ounce. Reduce these ingredients into powder.

810. *Compound powder of bole with opium.* L.

Take of opium strained, three drams. Dry it a little, so as to render it easily pulverable; and add to the foregoing species, that they may all beat into a powder together.

This powder with opium is an elegant reform of the

species of *Fractastorius's* confection, commonly called *diacordium*; consisting only of such of the ingredients of that composition as are most conducive to the intention for which it is at present prescribed. Forty-five grains of the powder contain one of opium.

The powder is directed to be kept in the shops without opium, for cases where the assistance of that drug is not wanted. It is a warm glutinous astringent; and is given in fluxes, or other disorders where medicines of this class are proper, in doses of a scruple or half a dram.

811. *Compound powder of cerusse. L.*

Take of cerusse, five ounces; sarcocolla, an ounce and a half; gum tragacanth, half an ounce. Beat them together into a powder.

This composition is the *trochisci albi* of Razi, brought back to its original simplicity with regard to the ingredients, and without the needless trouble of making it into troches. It is employed for external purposes, as in collyria, lotions, and injections, for repelling acrimonious humours, and in inflammations.

812. *Compound powder of crabs-claws. L.*

Take of the tips of crabs-claws prepared, one pound; pearls prepared, red coral prepared, each three ounces. Mix them together.

813. *Compound testaceous powder.*

Take of oyster-shells prepared, one pound; white chalk, half a pound. Mix them together.

This cheap absorbent powder is at least equally valuable as a medicine with the more costly and compounded crabs-claw and bezoardic powders of the shops. These kinds of preparations are given from half a scruple to half a dram, for absorbing or destroying acidities in the first passages; which seems to be the only good effect that can be reasonably expected from these simple antacid earths. If they meet with so acid to dissolve them, they promise to be injurious rather than beneficial.

It may here be proper to take notice of a quality hitherto little expected from these kind of substances, that of strongly promoting putrefaction. Flesh mixed with a small proportion of chalk, and exposed to a heat equal to that of the human body, not only corrupts sooner than without this addition, but likewise in a far greater degree, resolving in a few days into a perfect mucus. This quality of the absorbent powders (for the discovery of which, with many other curious experiments on the same subject, the public are obliged to Dr Pringle) seems to forbid their use in all those kinds of fevers where the animal-juices are already too much disposed to a putrescible state. Indeed, in fevers of any kind, though frequently employed, they are at best unserviceable; and perhaps their ill effects would be oftener seen, if it was not for the quantity of acids usually given in acute diseases.

814. *Bezoardic powder. L.*

Take of compound powder of crabs-claws, one pound; Oriental bezoar prepared, one ounce. Mix them together.

Bezoar has hitherto been an ingredient in the foregoing composition, which was then called *Gascoign's*

powder; though, notwithstanding the addition which this article made to the price, it added nothing to the virtue of the medicine. The college of London have therefore very prudently directed an absorbent powder without this costly article; and composed another, distinguished by its name, for the use of those who expect any particular virtues from it.

815, a. *Compound powder of contrayerva.*

Take of compound powder of crabs-claws, a pound and a half; contrayerva root, five ounces. Make them into a powder. *L.*

Take of contrayerva root, six drams; Virginian snake-root, two drams; English saffron, one dram; compound powder of crabs-claws, two ounces. Make them into a powder. *E.*

These medicines have a much better claim to the title of an alexipharmic and sudorific than the two foregoing compositions. The contrayerva, snake-root, and saffron, by themselves are such, and prove very serviceable in low fevers, where the vis vitæ is weak, and a diaphoresis to be promoted. It is possible that the crabs-claw powders are of no farther service than as they divide those powerful ingredients, and render them supportable to the stomach.

815, b. *Powder of chalk. E.*

Take of white chalk prepared, four ounces; nutmegs and cloves, of each half a dram. Mix them together into a powder, which supplies the place of the troches against the heartburn.

816. *Epileptic powder.*

Take wild valerian root, peony root, of each equal parts. Make them into a powder.

This powder may be looked on as a medicine of some importance for the purposes expressed in its title, far superior to those of similar intention in other pharmacopœias. The dose is from ten grains to half a dram for children, and from half a dram to two drams for adults.

817. *Compound powder of myrrh. L.*

Take of rue leaves dried, dittany of Crete, myrrh, each an ounce and a half; asafoetida, sagapenum, Russia castor, opopanax, each one ounce. Beat them together into a powder.

This is a reformation of the troches of myrrh, a composition contrived by Razi against uterine obstructions. It may be taken in any convenient vehicle, or made into boluses, from a scruple to a dram or more two or three times a day.

818. *Powder to promote delivery.*

Take of borax, half an ounce; castor, saffron, each a dram and a half; oil of cinnamon, eight drops; oil of amber, six drops. Beat the species together into a powder, to which add the oils, and mix the whole well together.

This medicine has long been held in esteem for the purpose expressed in its title; nevertheless, its real efficacy, and what share thereof is owing to each of the ingredients, has not been sufficiently determined: the borax, though by some thought to be of little importance, does not perhaps contribute least to its virtue.

tue. The dose is from a scruple to a dram, or so much as can be conveniently taken up at once on the point of a knife. It should be kept in a very close vessel, otherwise it will soon lose a considerable deal of its more valuable parts.

819. *Compound powder of scammony.*

Take of scammony, four ounces; calcined hartshorn prepared, three ounces. Grind them diligently together into a powder. *L.*

Take of scammony, crystals of tartar, of each two ounces; mix and rub them together into a very fine powder. *E.*

Here the scammony is divided by the earthy calx and salt, and thus rendered somewhat more soluble, and less adhesive; hence its purgative quality is promoted, at the same time that it becomes less griping. The dose of the compound is from fifteen grains to half a dram.

820. *Compound powder of senna.* *L.*

Take of crystals of tartar, senna, each two ounces; scammony, half an ounce; cloves, cinnamon, ginger, each two drams. Powder the scammony by itself, and all the other ingredients together; then mix them.

This powder is given as a cathartic, in the dose of two scruples or a dram. The spices are added, not only to divide, but to warm the medicine, and make it sit easier on the stomach. The scammony is used as a stimulus to the senna; the quantity of the latter necessary for a dose, when not assisted by some more powerful material, being too bulky to be conveniently taken in this form.

821. *Sternutatory powder.* *L.*

Take of asarum, marjoram, marum-fyriacum leaves dried, lavender flowers dried, each equal weights. Rub them together into a powder.

822. *Cephalic powder.* *E.*

Take of the leaves of asarum, three parts; of marjoram, one part. Beat them together into a powder.

The titles of these powders sufficiently express their intention. They are both agreeable and efficacious emetics, and superior to most of those usually sold under the name of *herb-snuff*.

823. *Styptic powder.* *E.*

Take of alum, an ounce and a half; gum kino, three drams. Make them into a powder.

This powder is a very powerful astringent.

824. *Compound powder of amber.* *L.*

Take of amber prepared, gum arabic, each ten drams; juice of hypocistis, balauftines, Japan earth, each five drams; olibanum, half an ounce; strained opium, one dram. Beat them together into a powder.

This medicine may be looked upon as an useful, and tolerably elegant astringent; though possibly the ingredient which it receives its name from, contributes little to its virtue. Two scruples of the composition contain one grain of opium.

825. *Compound powder of gum tragacanth.* *L.*

Take of gum tragacanth, gum arabic, marshmallow root, each an ounce and a half; starch, liquorice, each half an ounce; double-refined sugar, three ounces. Grind them into a powder.

This powder is a mild emollient; and hence becomes serviceable in hectic cases, tickling coughs, strangury, some kinds of alvine fluxes, and other disorders proceeding from a thin acrimonious state of the humours, or an abrasion of the mucus of the intestines: it softens and gives a greater degree of consistency to the former, and defends the latter from being irritated or excoriated by them. The dose is from half a dram to two or three drams, which may be frequently repeated.

826. *Hiera picra.*

Take of gum extracted from fucotorine aloes, one pound; canella alba, three ounces. Beat them separately into powder, and then mix them together. *L.*

Take fucotorine aloes, four ounces; Virginian snake-root, ginger, each half an ounce. Mix, and beat them into a powder. *E.*

These compositions were originally directed to be made into an electuary: with us, they have been rarely used in that form, and not often in this of a powder, on account of their great nauseousness. They are chiefly employed as the basis of a tincture called *tinctura sacra*. See n° 376.

827, a. *Aromatic species.* *L.*

Take of cinnamon, two ounces; lesser cardamom feed hulked, ginger, long pepper, each one ounce. Beat them together into a powder.

827, b. *Aromatic powder.* *E.*

Take of nutmegs, lesser cardamom seeds, ginger, each two ounces. Beat them together into a powder, to be kept in glass vessels well stopp'd.

Both these compositions are agreeable, hot, spicy medicines; and as such may be usefully taken in cold phlegmatic habits and decayed constitutions, for warming the stomach, promoting digestion, and strengthening the tone of the viscera. The dose is from ten grains to a scruple and upwards. The first is considerably the warmest.

828. *Species of scordium without opium.* *L.*

Take of bole armenic, or French bole, four ounces; scordium, two ounces; cinnamon, an ounce and a half; storax strained, tormentil root, bistort root, gentian, dittany of Crete, galbanum strained, gum arabic, red roses, each one ounce; long pepper, ginger, each half an ounce. Reduce them into powder.

829. *Species of scordium with opium.* *L.*

Take of strained opium, three drams. Dry it a little, that it may easily pulverize; and add it to the foregoing species in the beating, that they may be all reduced into a powder together.

This is the species of *Fracassorius's confectio*, or *diascordium*, which has been hitherto kept in the shops in the form of an electuary only, but is now ju-

diciously

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directions directed in that of a powder also, both with and without the opium: when made into an electuary, the medicine, in keeping, loses of its astringency, in which consists great part of its virtue. As this composition has in common practice been looked upon as a medicine of great consequence, and its effects determined by long experience; the college have made no farther alteration in its ingredients, than substituting red roses themselves to the sugar of roses, omitting sorrel seeds, which are certainly insignificant, and supplying the Lemnian earth, which with us is scarce ever met with genuine, by a proper increase of the bole.

830. *Saline cathartic powder.*

Take of vitriolated tartar, crystals of tartar, each one dram; sal prunel, or purified nitre, one scruple. Make them into a powder.

This is an useful cathartic in inflammatory disorders and a viscid impure state of the juices. The quantity above directed is intended for one dose, which should be accompanied with plentiful dilution.

831. *Carminative powder.*

Take of aniseed, sweet-fennel seed, each two scruples; ginger, one scruple; nutmegs, half a scruple; fine sugar, half a dram. Reduce them into a powder, for four doses.

This powder is employed for expelling flatulencies arising from indigestion, particularly those to which hypochondriacal and hysterical persons are subject. It is likewise usefully given in the gripes of young children, either mixed with their food or otherwise.

832. *Diuretic powder.*

Take of sal prunel, ten grains; salt of amber, four grains; oil of turpentine, three drops; fine sugar, one scruple. Drop the oil upon the sugar, then add the salts, and grind the whole together.

This powder is a very efficacious diuretic, and may be given to advantage in cases where the assistance of such forcing medicines is required. The salts somewhat abate the heating quality of the oil, and at the same time cool and relax the passages.

833. *Strengthening powder.*

Take of extract of Peruvian bark, 12 grains; salt of steel, two grains; oil of cinnamon, one drop; fine sugar, half a dram. Having mixed the oil with the sugar, add the other ingredients, and grind the whole well together for two doses.

This medicine has a much better title to the appellation of a *strengtheners*, than those usually met with under that name in dispensaries. In lax habits, debilities of the nervous system, the weakness peculiar to either sex, it has generally good effects.

834. *Powder against the king's evil.*

Take of burnt sponge, one scruple; nitre, coralline, fine sugar, each half a scruple. Reduce them into powder.

This powder is recommended in scrophulous disorders and obstructions of the glands: it is supposed to open and deterge the minute vessels, and carry off the offending matter by urine. Dr Mead informs us, in

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his *Manita Medica*, that he very frequently experienced its good effects; he used to give the quantity above prescribed, twice a day, with three or four glaises of the less compounded lime-water along with each dose: if the patient was much emaciated, the lime-water was mixed with about an equal quantity of milk.

835. *Vermifuge powder.*

1. Take of tanfy flowers, worm-feed, each three drams; salt of steel, one dram. Make them into a powder.
2. Take of tin reduced into fine powder, two drams; ethiops mineral, half a dram; fine sugar, one scruple. Mix them well together.
3. Take of choice rhubarb, three drams; scammony, calomel, each one dram. Mix, and make them into a powder.

All these compositions are well calculated for the purpose expressed in the title. The first is given in hospitals, in doses of half a dram twice a day; which quantity contains about four grains and a half of the salt of steel. The second is divided into three or four doses, one of which is taken every morning, and a cathartic on the day following. The third, which is a brisk purgative, is used in the quantity of half a dram, after the others have been premixed; or it is taken once or twice a week without their assistance.

836. *Compound powder of jalap.* E.

Take of jalap root, one ounce; crystals of tartar, two ounces. Mix, and rub them together into a very fine powder. E.

837. *Dover's sweating powder.*

Take of vitriolated tartar, four ounces and an half; opium, powdered ipecacuanha root, of each half an ounce. Mix, and rub them well together into a fine powder.

SECT. II. *Troches and Lozenges.*

836. *TROCHES* and *lozenges* are composed of powders made up with glutinous substances into little cakes, and afterwards dried. This form is principally made use of for the more commodious exhibition of certain medicines, by fitting them to dissolve slowly in the mouth, so as to pass by degrees into the stomach; and hence these preparations have generally a considerable proportion of sugar or other materials grateful to the palate. Some powders have likewise been reduced into troches, with a view to their preservation; though possibly for no very good reasons: for the moistening, and afterwards drying them in the air, must in this light be of greater injury than any advantage accruing from this form can counterbalance.

General rules for making troches.

- I. The three first rules laid down for making powders, are also to be observed in the powders for troches.
- II. If the mass proves so glutinous as to stick to the fingers in making up, the hands may be anointed with any convenient sweet or aromatic oil; or else sprinkled with powder of starch, or with that of liquorice.
- III. In order to thoroughly dry the troches, put them on an inverted sieve, in a shady, airy place, and frequently turn them.
- IV. Troches are to be kept in glass vessels, or in earthen ones well glazed.

838, a. *White pectoral troches.*

Take of double-refined sugar, a pound and a half; starch, an ounce and a half; liquorice, six drams; Florence orris root, half an ounce. Reduce these ingredients into powder, which is to be made up into troches with a proper quantity of mucilage of gum tragacanth. *L.*

Take of white sugar, one pound; gum arabic, two ounces; starch, one ounce; Florentine orris root, one ounce. Make them into troches with rose-water. *E.*

These compositions are very agreeable pectorals, and may be used at pleasure. They are calculated for softening acrimonious humours, and allaying the tickling in the throat which provokes coughing.

838, b. *Black pectoral troches.*

Take of extract of liquorice, gum arabic, each four ounces; white sugar, eight ounces. Boil the extract and gum in a sufficient quantity of water till they are dissolved: then having strained the liquor, add to it the sugar, and evaporate the mixture over a gentle fire, till it is of a proper consistence for being formed into troches. *E.*

This composition is designed for the same purposes as the white pectoral troches above described.

838, c. *Pectoral troches with opium.* *E.*

Take of opium, balsam of Peru, of each one dram; fine sugar, two drams; of the mafs for black pectoral troches, seven ounces. Rub the opium very well with the balsam and sugar; then gradually add the mafs of troches well softened with warm water. When all is very accurately mixed, form it into troches, each weighing 15 grains.

839. *Red-lead troches.*

Take of red-lead, half an ounce; corrosive mercury sublimate, one ounce; crumb of the finest bread, four ounces. Make them up with rose-water into oblong troches.

Red-lead troches are employed only for external purposes as escharotics: they are powerfully such, and require a good deal of caution in their use.

840. *Troches of nitre.*

Take of nitre purified, four ounces; double-refined sugar, one pound. Make them into troches with mucilage of gum tragacanth. *L.*

Take of nitre, three ounces; fine sugar, nine ounces. Powder them together, and make them into troches with mucilage of gum tragacanth. *E.*

This is a very agreeable form for the exhibition of nitre; though, when the salt is thus taken without any liquid (if the quantity is considerable) it is apt to occasion uneasiness about the stomach, which can only be prevented by large dilution with aqueous liquors.

841. *Troches of squills.* *L.*

Take of baked squills, half a pound; wheat flour, four ounces. Beat them together, and form the mafs into troches, which are to be dried with a gentle heat.

This preparation is used only as an ingredient in the *theriacal*.

842. *Troches of sulphur.*

Take of flowers of sulphur, washed, two ounces; double-refined sugar, four ounces. Beat them together; and, adding some mucilage of quince seeds, form them into troches. *L.*

Take of flowers of sulphur, two ounces; flowers of benzoin, one scruple; white sugar, four ounces; factitious cinabar, half a dram. Mucilage of gum tragacanth, as much as is sufficient. Mix, and make them into troches, according to art.

These compositions are to be considered only as agreeable forms for the exhibition of sulphur, no alteration or addition being here made to its virtue; unless that by the flowers of the benzoin in the second prescription, the medicine is supposed to be rendered more efficacious as a pectoral.

843. *Troches of Japan earth.* *L.*

Take of Japan earth, gum arabic, each two ounces; sugar of roses, 16 ounces. Beat them together; and dropping in some water, make them into troches.

A preparation of this kind, with the addition of ambergris and musk, which are here more prudently omitted, has long been in some esteem as a mild restraining, &c. under the title of *catechu*. These troches are sufficiently palatable, and of considerable service in some kinds of coughs, thin acrid disfluxions, diarrhæas, &c.

844. *Cardialgic lozenges.* *L.*

Take of chalk prepared, four ounces; crabs-claws prepared, two ounces; bole armenic, or French bole, half an ounce; nutmegs, one scruple; double-refined sugar, three ounces. Reduce these ingredients into powder, and make them into troches with water.

This composition is calculated against that uneasy sensation at the stomach, improperly called the *heart-burn*; in which it oftentimes gives immediate relief, by absorbing and neutralizing the acid juices that occasion this disorder. The absorbent powders here made use of are of the most powerful kind, though there does not seem to be any occasion for using more than one of them.

It is, however, to be observed, that absorbent compositions, though very effectual for the intention, are accompanied with an inconvenience, which is frequently complained of in their use; their binding the belly. The following is free from this inconvenience.

845. *Laxative antacid lozenges.*

Take of magnesia alba, six ounces; double-refined sugar, three ounces; nutmegs, one scruple. Mix them well together, and form them into troches with mucilage of gum tragacanth.

846. *Sugar of roses.* *L.*

Take of red-rose buds, freed from the heels, and hastily dried, one ounce; double-refined sugar, one pound. Reduce them separately into powder; then mix, and moisten them with water, that they may be formed into troches, which are to be dried by a gentle heat.

This preparation is chiefly valued for its agreeableness to the eye and palate. Some likewise esteem it
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medicinally, as a light refringent; and look upon it, not undeservedly, as an excellent addition to milk in phtical and hectic cases.

847. *Anthelmintic sugar cakes.*

1. Take of powdered tin, half a dram; fine sugar, half an ounce; rose-water, a sufficient quantity to make them into a mass for tablets.
2. Take of scammony, mercurius dulcis, each four grains; fine sugar, half an ounce; rose-water, a sufficient quantity to make them into tablets.

These compositions are calculated for children, who are not easily prevailed upon to take anthelmintic medicines in less agreeable forms. If the first is made use of, it must be repeated three or four mornings successively, after which a purge is to be taken; the second, if it requires a repetition, is to be given only every other morning. The proportions of the ingredients are to be varied, according to the age and strength of the patient.

848. *Nerve troches.*

Take of compound spirit of lavender, 60 drops; oil of cinnamon, oil of rosemary, each four drops; Florence orrice root, two drams; fine sugar, one ounce; mucilage of gum tragacanth, as much as will reduce them into a mass, which is to be formed into troches of about half a scruple each.

One or two of these troches taken occasionally, and suffered to dissolve in the mouth, prove serviceable to those who are subject to paralytic and other nervous disorders. Warm aromatic medicines, given in this form and manner, are supposed, from their slow dissolution in the mouth, to affect the nervous system more immediately than if received at once into the stomach.

849. *Purgive tablets.*

Take of crystals of tartar, half an ounce; scammony, three drams; oil of cinnamon, four drops; double-refined sugar, eight ounces. Make them up with rose-water into troches, weighing each about a dram.

This is a sufficiently elegant form for purgative troches. Each of the tablets contains two grains and a half of scammony.

850. *Rhubarb troches.*

Take of creme of tartar, rhubarb, each two drams; fresh lemon-peel, half a dram; fine sugar, four ounces. Make them into troches with rose-water.

Two drams of these troches contain about seven grains of rhubarb, and as much creme of tartar.

851. *Kunkel's antimonial tablets.*

Take of the best Hungarian antimony, levigated into an impalpable powder, three drams and a half; sweet almonds peeled, fresh pine-nuts, each half an ounce; cinnamon, one dram; lesser cardamom seeds husked, half a dram; double-refined sugar, four ounces. Dissolve the sugar in equal quantities of cinnamon-water and rose water; then mix therewith the other ingredients, and form the whole into tablets weighing one dram each.

These tablets were brought into esteem by Kunkel, at a time when the internal use of crude antimony was almost universally reckoned poisonous. He had re-

course to them as a desperate medicine, in violent pains and contractions of the arms, after all the common methods of cure had been used without any relief; and being happily, in a short time, perfectly freed from his complaints, he made trial of them in several other cases with remarkable success. He seems to have begun with doses of four or five grains, (that is, one of the tablets above prescribed); which were repeated thrice a day, and gradually increased to a dram or more of the antimony every day.

852. *Stialogogue troches.*

Take of peltitory of Spain, half an ounce; mastich, two drams; oil of cloves and marjoram, each one dram; yellow wax, a sufficient quantity. Make them into troches or pellets.

One of these troches is to be occasionally held in the mouth, and chewed, to promote a discharge of saliva; which they effect by warming and stimulating the salivary glands.

853. *Stomachic troches.*

Take of hard extract of Peruvian bark, one dram; oil of cinnamon, oil of mint, each ten drops; fine sugar, four ounces. Make them into troches, with mucilage of gum tragacanth.

These troches are of service for warming and strengthening the stomach, expelling flatulencies, and promoting digestion; for these purposes they are as effectual as any thing that can well be contrived in this form.

SECT. III. *Pills.*

854. To this form are peculiarly adapted those drugs which operate in a small dose; and whose nauseous and offensive taste or smell require them to be concealed from the palate.

Pills dissolve the most difficultly in the stomach, and produce the most gradual and lasting effects, of all the internal forms. This is, in some cases, of great advantage; in others, it is a quality not at all desirable; and sometimes it may even be of dangerous consequence, particularly with regard to emetics, which if they pass the stomach undissolved, and afterwards exert themselves in the intestines, operate there as violent cathartics.

Hence emetics are, among us, scarce ever given in pills. And hence to the refinous and difficultly soluble substances, saponaceous ones ought to be added, in order to promote their solution.

Gummy resins and inspissated juices, are sometimes soft enough to be made into pills, without addition: where any moisture is requisite, spirit of wine is more proper than syrups or conserves, as it unites more readily with them, and does not sensibly increase their bulk. Light, dry powders, require syrup or mucilages; and the more ponderous, as the mercurial and other metallic preparations, thick honey, conserve, or extracts.

Light powders require about half their weight of syrup; of honey, about three-fourths their weight; to reduce them into a due consistence for forming pills. Half a dram of the mass will make five or six pills of a moderate size.

General rules for making pills.

- I. The three first rules, formerly laid down for making

king powders, are here also to be carefully observed.

II. Gums and inspissated juices are to be first softened with the liquid prescribed: then add the powders, and continue beating them all together till they are perfectly mixed.

III. The masses for pills are best kept in bladders, which should be moistened now and then with some kind of liquid that the mass was made up with, or with some proper aromatic oil.

855. *Ethiopic pills.* E.

Take of quicksilver, six drams; honey, half an ounce; golden sulphur of antimony, gum guaiacum in powder, of each half an ounce. Having rubbed the quicksilver with the honey in a glass mortar, till the globules cease to appear, add the sulphur of antimony: then with mucilage of gum arabic make them into a mass of a proper consistence for pills.

These pills resemble Dr Plummer's, described in the *Edin. Essays*, (see n° 773. *supra*;) to which they are preferable in one respect, that they are less apt to run off by stool. They are an useful alternative both in cutaneous and venereal disorders. One-fourth part of the quantity above prescribed may be made into 60 pills; of which from one to four may be taken every night and morning, the patient keeping moderately warm during the whole time that this course is continued.

856. *Aromatic pills.* L.

Take of focolatine aloes, an ounce and a half; gum guaiacum, one ounce; aromatic species, balsam of Peru, each half an ounce. Reduce the aloes and gum guaiacum separately into powder; then mix them with the rest, and make the whole into a mass with a sufficient quantity of syrup of orange-peel.

These pills, taken in small doses, as half a scruple or little more, and occasionally repeated, warm the stomach, and by degrees the whole habit, and promote perspiration and all the natural secretions. If the dose is considerable, they operate gently by stool: and if continued for some time in smaller doses, they prove at length purgative, or introduce a salutary looseness.

857. *Aloetic pills.*

Take of focolatine aloes in powder, extract of gentian, of each two ounces; sal polychrest in powder, half an ounce. Mix, and make them into a mass of pills with simple syrup.

858. *Jalap pills.* E.

Take of extract of jalap, two ounces; aromatic species, half an ounce; simple syrup, a sufficient quantity. Beat them into a mass.

This composition was first received into the former edition of the pharmacopœia. One of the same kind, with powdered jalap in substance instead of the extract, is used in some of the London hospitals, as a cheap and effectual purge.

859. *Pills of scammony with aloes.*

Take of focolatine aloes, one dram; aromatic species, half a dram; scammony, one scruple; soft extract of liquorice, as much as is sufficient to reduce them

into a mass of a due consistence for being formed into pills.

This warm purgative is recommended for removing the crudities, &c. after a surfeit or debauch, and for preventing arthritic and other complaints incident to those who live high. The quantity above prescribed may be made into 30 pills, of which five or six are to be taken for a dose.

860. *The more simple colocynth pills.* L.

Take of pith of colocynth, scammony, each two ounces; oil of cloves, two drams. Pulverize the colocynth and scammony by themselves, then mix in the oil, and make the whole into a mass with syrup of buckthorn.

The operator should be careful, in pulverizing the colocynth, to avoid the finer particles that fly off from it; which, though they do not considerably affect the mouth or fauces, have sometimes been observed to occasion violent purging. The drug should first be well dried, cut with sheers into small pieces, and freed from the seeds; then rub it in an oiled mortar, adding a few drops of sweet oil occasionally during the trituration: afterwards mix this powder with the powdered scammony, add the essential oil prescribed, and make the mixture into a mass, as above directed. The composition is apt to grow stiff and dry in keeping, and therefore ought to be made pretty soft at first: the pills should be formed as they are wanted; for when long kept, they become so hard, as to have sometimes passed through the intestines undissolved.

These pills (formerly called *pilule de duobus*, or pills of two ingredients) are very strong cathartics, and ought not to be ventured upon in cases where less violent medicines will take effect. They have been often made use of in large doses, along with large doses also of mercurials, in venereal complaints, both in recent gonorrhœas, and in the swellings and inflammations which sometimes follow from the suppression of the discharge; but in both these cases they are apparently improper, as they generally injure the constitution, and as the latter complaint is for the most part aggravated by them. The dose is from 15 grains to half a dram: some have imprudently gone as far as two scruples.

861. *The pills called cochize.* E.

Take of colocynthida, one ounce; scammony, focolatine aloes, each two ounces; vitriolated tartar, two drams; oil of cloves, two drams; mucilage of gum arabic, a sufficient quantity. Powder the aloes, scammony, and salt, together; then add the colocynth in very fine powder, and the oil; lastly, with the mucilage make the whole into a mass of pills.

This composition, like the foregoing, is strongly cathartic; not less effectual, though somewhat less irritating.

862. *Colocynth pills with aloes.* L.

Take of focolatine aloes, scammony, each two ounces; pith of colocynth, one ounce; oil of cloves, two drams. Let the dry species be separately reduced to powder; then mix in the oil, and make the whole into a mass with syrup of buckthorn.

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By the diminution of coloquintida in this prescription, the ingredients are reduced to the proportions wherein they are set down in the original of Galen; and what is of greater consequence, the medicine becomes less ungrateful to the stomach, and less virulent in its operation.

863. *Deobstruent pills.* L.

Take of the aromatic pills, three ounces; rhubarb, extract of gentian, salt of steel, each one ounce; salt of wormwood, half an ounce. Beat them together into a mass, with solutive syrup of roses.

It is difficult to bring this mass into the due consistence, the two salts acting upon one another so as to make it swell and crumble. Notwithstanding the alkaline salt employed, the pill does not prove at all alkaline; for the acid of the salt of steel forsakes its metal, and unites with the alkali into a vitriolated tartar: whence some have proposed using, instead of the two salts here directed, an ounce of vitriolated tartar already made, and half an ounce of any of the calces of iron: this, they observe, prevents the inconvenience abovementioned, without making any apparent alteration in the quality of the medicine.

864. *Chalybeate cephratic pills.*

Take of the mass of common pills, called *Rufus's pills* described hereafter, one ounce and a half; gum ammoniacum, resin of guaiacum, each half an ounce; salt of steel, five drams; syrup of orange-peel, as much as is sufficient to reduce the whole into a mass.

Both these and the foregoing pills are very well calculated for answering the intention expressed in the title. A dram of the mass may be made into 12 pills, and two or three of these taken every night, or oftener, in chlorotic, or other cases, where warm, aperient, or deobstruent medicines are proper.

865. *Purging deobstruent pills.*

Take of focotorine aloes, extract of black hellebore, scammony, each one ounce; gum ammoniacum, resin of guaiacum, each half an ounce; vitriolated tartar, two drams; essential oil of juniper-berries, one dram. Beat them into a mass, with a sufficient quantity of syrup of buckthorn.

This composition may be given from eight or ten grains to a scruple or half a dram, according as it is intended to keep the belly open or to purge. Half a dram of the mass contains about six grains of each of the capital purgative ingredients; aloes, scammony, and extract of hellebore.

866. *Fetid pills.*

Take of asafetida, Russia castor, each one dram and a half; camphor half a dram; oil of hartshorn, 24 drops. Beat the camphor with the asafetida, then add the castor and oil of hartshorn, and make the whole into a mass.

867. *Gum pills.*

Take of galbanum, opopanax, myrrh, sagapenum, each one ounce; asafetida, half an ounce. Make them into a mass with syrup of saffron. L.

Take of asafetida, galbanum, myrrh, of each two ounces; rectified oil of amber, one dram. Mix

and make them into a mass with common syrup. E.

Preparations.

All these pills are designed for antihysterics and emmenagogues, and very well calculated for answering those intentions: half a scruple, a scruple, or more, may be taken every night or oftener.

The following compositions are calculated for the same intentions as the foregoing deobstruent, fetid, and gum pills.

1. Take of asafetida, wood-foot, myrrh, each two ounces; oil of amber, one dram and a half; syrup of figs, a sufficient quantity. Mix, and make them into a mass, according to art.
2. Take of asafetida, one dram; martial flowers, half a dram; oil of amber, eight drops; balsam of Peru, a sufficient quantity to reduce them into a mass.
3. Take of asafetida, gum ammoniacum, myrrh, aloes, rust of steel prepared, extract of gentian, each one scruple; syrup of ginger, as much as will make the other ingredients into a mass.
4. Take of galbanum, one dram; salt of steel, half a dram; asafetida, aromatic species, each one scruple; tincture of myrrh, as much as will make them into a mass.

A dram of either of the masses is to be made into 12 pills, one or two of which may be taken for a dose twice or thrice a-day.

868. *Mercurial pills.*

Take of purified quicksilver, honey, each one ounce; crumb of bread, two ounces. Grind them together in a glass-mortar till the mercurial globules cease to appear; then add a sufficient quantity of common syrup, and make the whole into a mass according to art. E.

Take of quicksilver, five drams; Strasburgh turpentine, two drams; cathartic extract, four scruples; rhubarb powdered, one dram. Grind the quicksilver with the turpentine until they are perfectly incorporated; then let the other ingredients be beat up with this mixture into a mass. If the turpentine happens to be too thick, soften it with a little oil-olive. L.

869. *Laxative mercurial pills.*

Take of pure quicksilver, one ounce; resin of guaiacum, extract of hellebore, powdered rhubarb, each half an ounce; common syrup, a sufficient quantity. Grind the quicksilver with the resin of guaiacum until they are perfectly incorporated; then add the other ingredients, and beat the whole into a mass according to art.

The three foregoing compositions are useful mercurial pills; the first as an alternative, the other two as purgative mercurials. They are all, however, liable to an inconvenience, uncertainty in regard to their strength: for the mercury is but loosely united with the other ingredients, and very apt to separate and run together in its original form; in which state it never exerts its proper virtue: though it appears perfectly extinguished by the matters it is ground with at first, part of it is apt to be spued out on beating up the mixture with the other ingredients into a mass.

870. *Gamboge pills.*

Take of focotorine aloes, extract of black hellebore, gamboge,

gamboge, mercurius dulcis, each two drams; essential oil of juniper-berries, half a dram; syrup of buckthorn, a sufficient quantity. Beat them into a mass.

This is a strong mercurial purgative, in which the mercurial preparation is not liable to the uncertainty which the crude quicksilver is accompanied with in the foregoing compositions. The dose is from 10 or 15 grains to half a dram.

871, a. *Thebaic, commonly called the pacific pills.* E. Take of opium, half an ounce; extract of liquorice, two ounces; Castile soap, an ounce and a half; Jamaica pepper, one ounce. Soften the opium and extract separately with water; then mix them together, and add the soap and pepper in powder; after which beat all well together into a mass.

871, b. *Saponaceous pills.* L. Take of almond-soap, four ounces; strained opium, half an ounce; essence of lemons, one dram. Soften the opium with a little wine; and then beat it with the rest, until they are perfectly mixed.

These are introduced in the room of those formerly so much celebrated under the name of *Starkey's* or *Matthew's* pills. The soap promotes the solution of the opium in the stomach, and thus occasions it to act the more quickly. The essence of lemons, in the last of these prescriptions, gives an agreeable flavour, makes the medicine sit easier on the stomach, and prevents a nausea, which it would otherwise be apt to occasion. Ten grains of the pill contain nearly one grain of opium.

871, c. *Storax pills.* L. Take of strained storax, two ounces; saffron, one ounce; strained opium, five drams. Beat them together till perfectly united.

These are contrived for dissolving more slowly in the stomach than the saponaceous pills, and consequently producing more gradual and lasting effects.

871, d. *Olibanum pills.* E. Take of olibanum, two ounces; myrrh, one ounce; opium, five drams; balsam of Peru, two drams; common syrup, a sufficient quantity. Make them into a mass; which supplies the place of the storax pills.

872. *Pectoral pills.* Take of gum ammoniacum, half an ounce; balsam of Tolu, two drams; flowers of benzoin, English saffron, each one dram; common syrup, a sufficient quantity. Make them into a mass according to art.

This composition is very well contrived for promoting expectoration; and may be usefully given in common colds, and in difficulty of breathing proceeding from viscid phlegm: the dose is from six or eight grains to a scruple or more.

873. *Rufus's pills.* L. Take of fœcotrine aloes, two ounces; myrrh, saffron, each one ounce. Make them into a mass with syrup of saffron. L.

Take of fœcotrine aloes, two ounces; myrrh, one ounce; saffron, half an ounce. Beat them into a

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mass with a proper quantity of syrup of orange-peel. E.

The pills, given to the quantity of half a dram or two scruples, prove considerably cathartic; but they answer much better purposes in smaller doses as laxatives or alteratives.

874. *Squill pills.*

Take of Spanish soap, one ounce; gum ammoniacum, millepedes prepared, fresh squills, each half an ounce; balsam of Copaiba, as much as is sufficient. Reduce them into a mass according to art.

* This is an elegant and commodious form for the exhibition of squills, whether for promoting expectoration, or in the other intentions to which that medicine is applied.

875. *Pills against the dysentery.*

Take of yellow wax, half an ounce; spermaceti, Japan earth, each one dram; oil of cinnamon, twelve drops. Make them into a mass.

This medicine has often been of great benefit for the purpose expressed in its title; at the same time strengthening the intestines, and covering them with a soft mucus, which defends them from being irritated by the acrimony of the humours. Each half dram of the mass may be formed into five or six pills for one or two doses.

876. *Spermaceti pills.*

Take of spermaceti, one dram; white sugar-candy in powder, two drams; balsamic syrup, as much as is sufficient. Grind the spermaceti with the sugar till they are perfectly mixed; then adding the syrup, rub them with a warm pestle into an uniform mass.

Where spermaceti cannot be commodiously exhibited in any other form, three or four moderate-sized pills, made from this mass, may be taken two or three times a-day, in erosions of the viscera by acrimonious humours, tickling coughs, and other like disorders.

877. *Plummer's pills.* E.

Take of sweet mercury, golden sulphur of antimony, of each six drams; extract of liquorice, half an ounce; rub the mercury with the sulphur till they are thoroughly incorporated; then add the extract, and with mucilage of gum arabic make the whole into a mass.

SECT. IV. *Boluses.*

878. *Boluses* differ little in consistence from electuaries, being only somewhat stiffer, so as to retain their figure without spreading or falling flat.

This form is very convenient for the exhibition of the more powerful medicines, which require their doses to be exactly adjusted, as the stronger alexipharmacs, cathartics, and opiates. As boluses are chiefly intended for immediate use, volatile salts, and other materials, which, if the mass was to be kept, would exhale or swell it, are frequently admitted into them.

The quantity of a bolus very seldom exceeds a dram: if the ingredients are of the lighter kind, even this will be too bulky to be commodiously swallowed down.

The lighter powders are made up with syrup: a scruple or 26 grains of the powder, with as much sy-

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rup as will bring it to a due consistence, makes a bolus sufficiently large.

The more ponderous powders, as the mercurial ones, are commonly made up with conserve, syrups scarce holding them together. For the testaceous powders also an addition of conserve is used; though, if made up with this alone, they would be too bulky.

Both the light and ponderous powders may be conveniently made up with mucilage, which increases the bulk less than the other additions, and occasions them to pass down more freely.

The official pharmacopœias have no formula of this kind: most of the following compositions are taken from our hospitals.

879. *Alexipharmonic bolus.*

1. Take of compound powder of contrayerva, half a scruple; syrup of wild poppies, a sufficient quantity to make it into a bolus.
2. Take of contrayerva root, half a scruple; syrup of saffron, as much as is sufficient. Make them into a bolus.
3. Take of Virginian snakeweed, half a scruple; confection of kermes, as much as is sufficient. Mix and make them into a bolus.
4. Take of Virginian snakeweed, contrayerva root, each eight grains; saffron, three grains; syrup of meconium, a sufficient quantity to reduce them into a bolus.
5. Take of camphor, two grains; saffron, five grains; cordial confection, one scruple. Mix and make them into a bolus.
6. Take of camphor, two grains; nitre, contrayerva root, each ten grains; syrup of clove-julyflowers, as much as will make them into a bolus.
7. Take of musk, ten grains; salt of hartshorn, or of sal ammoniac, five grains; Thebaic extract, half a grain; syrup of saffron, a sufficient quantity. Make them into a bolus.

These boluses are designed for low depressed fevers, in which medicines of this kind are generally prescribed, for keeping up the vis vitæ, raising the pulse, and promoting a diaphoresis. The compositions differ in strength, nearly according to the order in which they stand. The last is of great power, and designed chiefly for cases accompanied with convulsive symptoms, which are often abated by it.

880. *Caster bolus.*

Take of castor, one scruple; salt of hartshorn, five grains; or oil of hartshorn, five drops; simple syrup, a sufficient quantity. Make them into a bolus.

This medicine is given in hysterical and hypochondriacal disorders, and likewise as an alexipharmonic in fevers. Its virtues, which are great and unquestionable, seem to depend more on the fetid animal-oil, or volatile salt, than on the drug from whence it takes its name.

881. *Diaphoretic bolus.*

Take of compound powder of contrayerva, crude sal ammoniac, each one scruple; simple syrup, a sufficient quantity to form them into a bolus.

This bolus is given in fevers, and other cases where a diaphoresis is to be promoted. Sal ammoniac is for this purpose one of the most efficacious of the neutral

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salts. It requires, however, when thus given in a solid form, to be assisted by warm diluents, frequently repeated; which not only promote its action, but likewise prevent its sitting uneasy on the stomach.

882. *Diuretic bolus.*

Take of fresh squills, six grains; compound powder of arum, ten grains; ginger, five grains; syrup of orange-peel, a sufficient quantity. Make them into a bolus.

This composition is recommended by Dr Mead, to be taken every morning in hydropic cases, for promoting urine. He observes, that in these disorders, diuretic medicines vary greatly in their effects, those which answer sufficiently in one person failing in another; and that the squill and its preparations are of all others those which most generally succeed.

883. *Bolus against the dysentery.*

Take of the cordial confection, French bole, each one scruple; thebaic extract, one grain. Make them into a bolus.

This composition is excellently well calculated for the purpose expressed in its title. Dr Mead assures us, that he has never found any one medicine more effectual, either for restraining the flux, or healing the excoriated membranes. Previous to the use of this or other like medicines, the first passages must be cleaned by mild emetics and cathartics, as ipecacuanha and rhubarb.

884. *Emmenagogue bolus.*

Take of socotorine aloes, eight grains; saffron, four grains; Guinea pepper, two grains; oil of fava, two drops; conserve of rue, as much as is sufficient to reduce them into a due consistence.

Take of black hellebore root, eight grains; fresh squills, four grains; essential oil of pepper-mint, two drops; conserve of orange-peel, as much as is sufficient to make them into a bolus.

These are medicines of great power for promoting or exciting the menstrual flux. The first is calculated for lax phlegmatic habits; the other for persons of a sanguine temperament, where chalybeate medicines cannot be borne.

885. *Febrifuge bolus.*

Take of Peruvian bark, one scruple; cascarilla, half a scruple; mucilage of quince seeds, a sufficient quantity to make them into a bolus.

This elegant composition is excellently well adapted to the cure of intermittent fevers, and may be given in cases where the Peruvian bark by itself would be less proper. Where aromatics, chalybeates, bitters, &c. are also requisite, they are either to be premixed, or occasionally interposed.

886. *Hysteric bolus.*

Take of musk, asafoetida, each six grains; castor, half a scruple; syrup of saffron, as much as is sufficient to make them into a bolus.

This medicine is a very well contrived one for the purpose expressed in its title. It is of great service both in hysterical and hypochondriacal disorders; and often gives relief in the depressions, faintings, statu-
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lent colics, headaches, and other symptoms attending them. It may be taken twice a-day along with any suitable liquor.

887. *Iliac bolus.*

Take of cathartic extract, one scruple; thebaic extract, one grain. Make them into a bolus.

This bolus is prescribed by Dr Mead for easing the pain and procuring stools in the iliac-passion and dry belly-ach; where the irritating cathartics, exhibited by themselves, are thrown up by vomit. The use of this medicine is to be preceded by plentiful bleeding, and accompanied with purgative glysters of the more acrid kind; and its operation promoted by infusion of sena mixed with a little of the elixir of health, or tincture of sena.

888. *Mercurial bolus.*

Take of calomel, from five to fifteen grains; conserve of roses, half a dram. Mix, and make them into a bolus.

This bolus is given every night, or oftener, for raising a salivation in venereal and other disorders, which require that Herculean operation. It is likewise taken at night as an alterative, to be carried off next morning by a cathartic: mercurials exhibited in this manner, have generally better effects than when joined with purgatives directly.

889. *Pectoral bolus.*

Take of spermaceti, fifteen grains; gum ammoniacum, ten grains; salt of hartshorn, five grains; simple syrup, as much as is sufficient. Mix, and make them into a bolus.

In colds of long standing, old coughs, asthma, and beginning consumptions, this bolus generally gives relief; especially if bleeding is premised, and repeated, if necessary, at proper intervals.

890. *Bolus of rhubarb with mercury.*

Take of choice rhubarb, twenty-five grains; calomel, five grains; simple syrup, as much as will form them into a bolus.

This is a very mild mercurial purgative. It is given to destroy worms, and in cachectic, chlorotic, and other like disorders.

891. *Rheumatic bolus.*

Take of extract of guaiacum, half a dram; salt of hartshorn, seven grains; simple syrup, a sufficient quantity. Make them into a bolus.

In chronic rheumatism, whether the remains of a rheumatic fever, or a continuation of pains that proceeded at first from neglected colds, this bolus has been given with good effects once a-week, or oftener, the patient keeping warm, and drinking warm liquors to promote its operation as a cathartic and diaphoretic. Its use ought to be accompanied by venesection, which is to be repeated every eight or ten days as long as the blood is *visy*.

892. *Sudorific bolus.*

Take of camphor, five grains; thebaic extract, one grain; syrup of orange-peel, a sufficient quantity to reduce them into a bolus.

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This medicine is one of the most effectual sudorifics, generally exciting a copious sweat.

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tions.SECT. V. *Electuaries.*

893. ELECTUARIES are composed chiefly of powders mixed up with syrups, &c. into such a consistence that the powders may not separate in keeping, that a dose may be easily taken up on the point of a knife, and not prove too stiff to swallow.

Electuaries receive chiefly the milder alterative medicines, and such as are not ungrateful to the palate. The more powerful drugs, as cathartics, emetics, opiates, and the like, (except in officinal electuaries to be dispensed by weight), are seldom trusted in this form, on account of the uncertainty of the dose; digestsul ones, acrids, bitters, foetids, cannot be conveniently taken in it; nor is the form of an electuary well fitted for the more ponderous substances, as mercurials, these being apt to subside in keeping, unless the composition is made too stiff.

The lighter powders require thrice their weight of honey, or syrup boiled to the thickness of honey, to make them into the consistence of an electuary; of syrups of the common consistence, twice the weight of the powders is sufficient.

Where the common syrups are employed, it is necessary to add likewise a little conserve, to prevent the compound from drying too soon. Electuaries of Peruvian bark, for instance, made up with syrup alone, will often in a day or two grow too dry for taking.

Some powders, especially those of the less grateful kind, are more conveniently made up with mucilages than with syrups, honey, or conserve. The three latter stick about the mouth and fauces, and thus occasion the taste of the medicine to remain for a considerable time; whilst mucilages pass freely, without leaving any taste in the mouth. A little soft extract of liquorice, joined to the mucilage, renders the composition sufficiently grateful, without the inconveniences of the more adhesive sweets.

The quantity of an electuary directed at a time, in extemporaneous prescription, is rarely less than an ounce, or more than three ounces.

* *General rules for making electuaries.*

- I. The rules already laid down for decoctions and powders in general, are likewise to be observed in making decoctions and powders for electuaries.
- II. Gums, inspissated juices, and such other substances as are not pulverable, should be dissolved in the liquor prescribed: then add the powders by little and little, and keep the whole briskly stirring, so as to make an equable and uniform mixture.
- III. Astringent electuaries, and such as have pulps of fruits in their composition, should be prepared only in small quantities at a time: for astringent medicines lose greatly of their virtues on being kept in this form, and the pulps of fruits are apt to become sour.
- IV. The superfluous moisture of the pulps should be exhaled over a gentle fire before the other ingredients are added to them.
- V. Electuaries, if they grow dry in keeping, are to be reduced to the due consistence, with the addition of a little Canary wine, and not with syrup or honey;

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ney : by this means the dose will be the least uncertain ; a circumstance deserving particular regard, in those especially which are made up with syrup, and contain a large quantity of opium, as the confection called *paulina* and *philonium*, n° 902. & 904.

894. *Electuary of cassia.* L.

Take of solutive syrup of roses, pulp of cassia, fresh extracted, each half a pound ; manna, two ounces ; pulp of tamarinds, one ounce. Grind the manna in a mortar, and with a gentle heat dissolve it in the syrup : then add the pulps, and continue the heat until the whole is reduced to a due consistence.

895. *Diacaassia.* E.

Take of pulp of cassia, six ounces ; pulp of tamarinds, Calabrian manna, of each an ounce and a half ; syrup of pale roses, six ounces. Dissolve the manna, beat in a mortar, in the syrup with a gentle heat ; then mix in the pulps, so as to make the whole into an uniform electuary, according to art.

These compositions are very convenient officialis to serve as a basis for purgative electuaries, and other like purposes ; as the pulping a small quantity of the fruits, for extemporaneous prescription, is sufficiently troublesome. The tamarinds give them an agreeable taste, and do not subject them, as might be expected, to turn sour : after standing for four months, the composition was found no sourer than when first made up. They are likewise usually taken by themselves, in the quantity of two or three drams occasionally, for gently loosening the belly in colic habits.

896. *Lenitive electuary.*

Take of figs, one pound ; fena, eight ounces ; pulp of tamarinds, pulp of cassia, pulp of French prunes, each half a pound ; coriander seeds, four ounces ; liquorice, three ounces ; double-refined sugar, two pounds and a half. Pulverise the fena along with the coriander-seeds, and sift out ten ounces of the powder ; the remainder is to be boiled with the figs and liquorice, in four pints of water to one half ; then strain and press out the liquor, and evaporate it to the weight of a pound and a half, or somewhat less : in this dissolve the sugar, so as to make it into a syrup ; and add this syrup, by little and little, to the pulps : lastly, mix in the powder before separated by the sieve. L.

This electuary may be occasionally taken to the quantity of a nutmeg or more, for loosening the belly in colic habits. It is frequently employed in glysters, though for that use the following is rather more convenient.

Take of fena, eight ounces ; coriander-seeds, four ounces ; pulp of prunes, two pounds. Powder the leaves and seeds ; then add the pulps, and mix the whole well together, so as to make them into an electuary. E.

897. *Pectoral electuary.*

Take of rob of elder-berries, two ounces ; spermaceti dissolved in a sufficient quantity of yolk of eggs, half an ounce ; flowers of benzoine, one dram ; balsamic syrup, as much as is sufficient to make the other ingredients into an electuary.

This is a very useful medicine in tickling coughs

and common colds, calculated both to obtund acrimony and promote expectoration. It may be used two or three times a-day, in doses of about the quantity of a small nutmeg. Taken to the bulk of a large nutmeg, at bed-time, it generally not only relieves the breast, but tends to procure a salutary diaphoresis or sweat in the night.

898. *Electuary of scammony.* L.

Take of scammony, an ounce and a half ; cloves, ginger, each six drams ; essential oil of caraway-seeds, half a dram ; honey, half a pound. Let the spices be ground together, and mixed with the honey ; then add the powdered scammony, and afterwards the oil.

This electuary is a warm brisk purgative. It is a reform of the *electuarium caryocostinum* of our preceding dispensaries ; a composition which was greatly complained of, as being inconvenient to take on account of the largeness of its dose. A dram and a half of this, which contains fifteen grains of scammony, is equivalent to half an ounce of the other.

899. *Japonic confection.* E.

Take of Japan earth, four ounces ; gum kino, three ounces ; nutmeg, and cinnamon, each one ounce ; opium dissolved in a sufficient quantity of white-wine, half a dram ; syrup of dry roses, boiled to the thickness of honey, thrice the weight of the powders. Mix and make them into an electuary, which supplies the place of diacordium.—It is a moderately warm astringent and opiate.

900. *Locatelli's balsam.*

Take of oil-olive, one pint ; Straßburg turpentine, yellow wax, each half a pound ; red sanders, six drams. Melt the wax over a gentle fire, with some part of the oil ; then add the rest of the oil, and the turpentine ; afterwards mix in the sanders, and keep them stirring together, until the mixture is grown cold. L.

Take of yellow wax, one pound ; oil of olive, a pint and a half ; Chio or Straßburg turpentine, a pound and a half ; balsam of Peru, two ounces ; dragons blood, in powder, one ounce. Melt the wax in the oil over a gentle fire, then add the turpentine ; and having taken them from the fire, mix in the balsam of Peru and dragons blood, keeping them continually stirring till grown cold.

Dragons blood gives a more elegant colour to this composition than red sanders ; though on another account it is somewhat less proper, having been found, when dissolved in oil, to communicate some degree of heat and pungency, qualities quite foreign to the intention of the medicine. This balsam is used in internal bruises and hæmorrhages, erosions of the intestines, dysenteries, and in some kinds of coughs and asthma : the dose is from two scruples to two drams : it may be commodiously taken with about double its weight of conserve of roses, as directed hereafter. Some have likewise applied it externally, for deterring and incarnating recent wounds and ulcers.

901. *Cordial confection.* E.

Take of conserve of rosemary flowers, three ounces ; candied

candied nutmegs, one ounce and a half; candied ginger, six drams; cinnamon in fine powder, half an ounce; syrup of orange-peel, as much as is sufficient. Mix them into an electuary, according to art.

Particular care ought to be had in the choice of the essential oil; for on its goodness, that of the medicine in great measure depends.

902. *The confectio called paulina.* L.

Take of costus, or (in its stead) zedoary; cinnamon, long pepper, black pepper; storax, galbanum, opium, strained; each two ounces: Russia castor, two ounces; simple syrup, boiled to the consistence of honey, thrice the weight of the other ingredients. Warm the syrup, and carefully mix with it the opium first dissolved in wine: gradually add this mixture, whilst it continues warm, to the storax and galbanum previously melted together; and afterwards sprinkle in the other species reduced into powder.

This is a warm opiate medicine, and as such is sometimes made use of in practice: thirty-two grains contain one grain of opium.

903, a. *Mithridate, or the confectio of Damocrates.* L.

Take of cinnamon, fourteen drams; myrrh, eleven drams; agaric, Indian nard, ginger, saffron, seeds of Mithridate-mustard, frankincense, Chio turpentine, each ten drams; camels hay, costus or (in its stead) zedoary, Indian leaf or (in its stead) mace, stœchas, long pepper, hartwort seeds, hypocistis, storax strained, opopanax, galbanum strained, opobalsam or (in its stead) expressed oil of nutmegs, Russia castor, each one ounce; mountain poley, scordium, carbobalsam or (in its stead) cubebs, white pepper, Candy carrot feed, bdellium strained, each seven drams; Celtic nard, gentian root, dittany of Crete, red roses, Macedonian parsley seed, lesser cardamom seeds hulked, sweet-fennel seed, gum arabic, opium strained, each five drams; calamus aromaticus, wild valerian root, aniseed, fagapenum strained, each three drams; meum athamanicum, St John's wort, acacia or (in its stead) terra Japonica, bellies of skinks, each two drams and a half; clarified honey, thrice the weight of all the other ingredients. Warm the honey, and mix with it the opium dissolved with wine; melt the storax, galbanum, turpentine, and opobalsam (or expressed oil of nutmegs) together in another vessel, continually stirring them about to prevent their burning; with these so melted, mix the hot honey, at first by spoonfuls, and afterwards in larger quantities at a time; when the whole is grown almost cold, add by degrees the other species reduced into powder.

903, b. *Theriaca Andromachi, or Venice treacle.* L.

Take of troches of squills, half a pound:—long pepper, opium strained, vipers dried, each three ounces:—cinnamon, opobalsam, or (in its stead) expressed oil of nutmegs, each two ounces:—agaric, Florence orris root, scordium, red roses, nawew seeds, extract of liquorice, each an ounce and a half:—Indian nard, saffron, amomum, myrrh, costus or (in its stead) zedoary, camels hay, each one

ounce:—cinquefoil root, rhubarb, ginger, Indian leaf or (in its stead) mace, dittany of Crete, borehound leaves, calamint leaves, stœchas, black pepper, Macedonian parsley seed, olibanum, Chio turpentine, wild valerian root, each six drams:—gentian root; celtic nard; spignel; leaves of poley mountain, St John's wort, groundpine; germander tops, with the seed; carbobalsam, or (in its stead) cubebs; aniseed; sweet-fennel seed; lesser-cardamom seeds, hulked; seeds of bishops-weed, hartwort-treacle, mustard; hypocistis; acacia, or (in its stead) Japan earth; gum arabic; storax strained; fagapenum strained; terra Lemnia, or (in its stead) bole armenic or French bole; green vitriol calcined; each half an ounce:—small or (in its stead) the long birthwort root; lesser centaury tops; Candy carrot feed; opopanax; galbanum strained; Russia castor; Jews pitch, or (in its stead) white amber prepared; calamus aromaticus; each two drams:—clarified honey, thrice the weight of all the other ingredients. Let these ingredients be mixed together, after the same manner as directed in making the mithridate.

These celebrated electuaries are almost the only remains, which the late reformation has left in the shops, of the wild exuberance of composition, which the superstition of former ages brought into vogue. The theriaca is a reformation of mithridate, made by Andromachus, physician to Nero: the mithridate itself is said to have been found in the cabinet of Mithridates king of Pontus. The first publishers of this pompous arcanum were very extravagant in their commendations of its virtues; the principal of which was made to consist in its being a most powerful preservative against all kinds of venom; whoever took a proper quantity in the morning, was insured from being poisoned during that whole day: this was confirmed by the example of its supposed inventor; who, as Celsus informs us, was, by its constant use, so fortified against the commonly-reputed poisons, that none of them would have any effect upon him when he wanted their assistance. But the notions of poisons which prevailed in those ruder ages, were manifestly erroneous. Before experience had furnished mankind with a competent knowledge of the powers of simples they were under perpetual alarms from an apprehension of poisons, and busied themselves in contriving compositions which should counteract their effects, accumulating together all those substances which they imagined to be possessed of any degree of alexipharmic power. Hence proceed the voluminous antidotes which we meet with in the writings of the ancient physicians: yet it does not appear that they were acquainted with any real poison, except the cicuta, acornitum, and bites of venomous beasts; and to these they knew of no antidote whatever. Even admitting the reality of the poisons, and the efficacy of the several antidotes separately, the compositions could no more answer the purposes expected from them, than the accumulating of all the medicinal simples into one form could make a remedy against all diseases.

Yet notwithstanding the absurdity in the original intention of these medicines, and their enormity in point of composition, as they contain several powerful materials, whose virtues, though greatly prejudiced,

Composi- yet are not destroyed, by their multiplicity and contrariety; the compounds have been found, from repeated experience, to produce very considerable effects, as warm opiate diaphoretics.

The college of Edinburgh, paying very little deference to antiquity or common prejudice, ventured at length to discard these venerable reliques; and substituted in their room an elegant and simple form, equivalent to them both in efficacy, under the title of

903. c. *Edinburgh theriaca.*

Take of Virginian snake-root, ten ounces; contrayerva root, six ounces; resin of guaiacum, four ounces; lesser cardamom seeds, two ounces; myrrh, English saffron, opium, each one ounce; rob of elderberries, thrice the weight of the powders; Canary wine, as much as is sufficient to dissolve the opium. Make them according to art into an electuary.

This composition consists of very powerful ingredients, and is doubtless capable of answering every thing that can be reasonably expected from the more voluminous theriaca of Andromachus. The London college also had formerly their theriaca, composed of the less exceptionable ingredients of Andromachus's. But as these medicines have for a long time been chiefly employed for external purposes, by way of cataplasm, the London theriaca is now omitted; and its place supplied by a cataplasm composed of a few well-chosen articles, under the name of *cataplasma e cynino*, or "cataplasm of cummin." For internal use, none of the theriacas are at present so much regarded as they have been heretofore; practitioners having introduced in their room extemporaneous boluses of Virginian snakeroot, camphor, contrayerva, and the like; which answer all their intentions, with this advantage, that they may be given either with or without opium, an ingredient which renders the others prejudicial in cases where they might otherwise be proper. The present edition of the Edinburgh pharmacopœia has also rejected the *theriaca Edinensis*, and in its room adopted the following composition under the title of

903. d. *Thebaic electuary.*

Take of aromatic species, six ounces; Virginian snake-root in powder, three ounces; opium dissolved in white-wine, three drams; clarified honey, thrice the weight of the powders. Mix all together into an electuary.

904. *London philonium.*

Take of white pepper, ginger, caraway seeds, each two ounces; strained opium, six drams; syrup of meconium, boiled to the consistence of honey, thrice the weight of the other ingredients. Heat the syrup, and carefully mix it with the opium, previously dissolved in wine; then add the other ingredients, reduced into powder. *L.*

This is a reformation of the *philonium* described by Galen, which was received in our preceding pharmacopœias with the addition of some superfluous ingredients, and distinguished, but not very properly, by the epithet *Romanum*. The additional articles, and some unnecessary ones that were in the original, are here omitted, and the quantities of the others varied, so as

to preserve the same proportion of opium to the whole, as in the last *L. pharmacopœia*. Thirty-six grains of the composition contain one grain of opium.

905. The mithridate, theriaca, diascordium, confectio Paulina, and philonium, are the only compositions now remaining, of what have been called the *officinal capitals*. They are all medicines of great power; and as, on the one hand, they are applicable, by the judicious physician, to excellent purposes; so, on the other, their imprudent use has often been productive of mischievous consequences. It has been customary among nurses and others, to give diascordium to children, to ease their complaints, and to procure sleep: intentions which it effectually answers; but at the same time never fails to bring on a costive habit, the foundation of many diseases: this medicine has likewise been too unwarily given for restraining fluxes; whose suppression was afterwards followed by more dangerous symptoms. The celebrated alexipharmacs, mithridate and theriaca, have oftentimes aggravated the disorders they were intended to remedy, have converted a common cold into a high fever, and have raised slight febrile complaints into a malignant fever. However strongly, therefore, these kinds of medicines are recommended for easing pain, warming, promoting sweat, expelling malignity, &c. the utmost caution is requisite in the use of them; the cases which demand their assistance are much less frequent than is generally supposed.

906. *Acid electuary.*

Take of conserve of wood-sorrel, one ounce; pulp of tamarinds, half an ounce; weak spirit of vitriol, as much as is sufficient to give a grateful acidity: syrup of lemon-juice, as much as will reduce the whole into the consistence of a soft electuary.

This grateful acid composition is an useful refrigerant and antiseptic in different kinds of inflammatory and putrid disorders.

907. *Alexeterial electuary.*

Take of confection of kermes, one dram; candied ginger, six drams; contrayerva root, Virginian snake-root, each one dram; syrup of orange-peel, as much as is sufficient to make the other ingredients into the consistence of an electuary.

This is a moderately warm electuary, contrived by Boerhaave for raising and recruiting the strength in low fevers, where the pulse is sunk, and the patient languid and dejected. It may be taken to the quantity of a small nutmeg every four or five hours, with any proper julep.

908. *Anti-epileptic electuary.*

Take of Peruvian bark, one ounce; wild valerian root, two drams; syrup of orange-peel, a sufficient quantity to reduce the others into an electuary.

This medicine has been frequently prescribed by Dr Mead, in epileptic cases, with success: he directs one dram to be taken every morning and evening, for three months together; after which, to confirm the cure and prevent a relapse, the same dose is to be repeated for three or four days before every new and full moon for a considerable time.

909. *Anti-dysenteric electuary.*

Take of yellow wax, three drams; spermaceti, two drams; conserve of red roses, an ounce and a half; oil of almonds, half an ounce; balsamic syrup, a sufficient quantity. Let the wax and spermaceti be melted in the oil, over a gentle fire, and then mixed with the conserve and syrup.

Where sharp irritating humours have eroded the intestines, and laid open the mouths of the blood-vessels, this soft healing electuary is often of great use. It is said that fluxes of long standing, contracted in the Indies, which had yielded nothing to medicines of the restraining kind, have been removed by this, which supplies the natural mucus of the bowels that the flux has carried off, heals the excoriations, and obtunds the acrimonious humours.

910. *Aromatic electuary.*

Take of the aromatic species, one dram and a half; conserve of lavender, two ounces; syrup of orange-peel, a sufficient quantity. Make them into an electuary.

This warm cordial medicine is of use in nervous complaints and decays of constitution. The bulk of a small nutmeg may be taken two or three times a-day with a glass of wine or any other proper liquor after it.

911. *Balsamic electuary.*

Take of conserve of roses, two ounces; Locatelli's balsam, one ounce; dissolve the balsam in the yolk of an egg, and then mix therewith the conserve.

This electuary is used in some coughs, and disorders of the breast; as also in the vomica, or suppuration in the stomach, which sometimes happens after dysenteries; and where there is an erosion or rupture of the blood-vessels, as in hæmoptics. In these cases, the bulk of a nutmeg may be taken for a dose twice or three a-day.

912. *Chalybeate electuary.*

1. Take of salt of steel, one dram; candied nutmegs, candied ginger, each half an ounce; oil of cinnamon, five drops; conserve of orange-peel, one ounce; balsamic syrup, as much as is sufficient to make them into an electuary.
2. Take of rust of steel, or steel prepared with sulphur, six drams; candied ginger, one ounce; conserve of orange-peel, three ounces; syrup of orange-peel, as much as will reduce them into a proper consistence.

These elegant chalybeate medicines are given not only in cachectic and chlorotic cases, and menstrual obstructions, but likewise in low hysterical and melancholic disorders; and for warming and invigorating the habit in great debilities and decays of constitution. In either of these intentions, the bulk of a small nutmeg is to be taken twice a-day, and its effects promoted by moderate exercise.

913. *Electuary of black hellbore.*

Take of black hellbore root, extract of favin, compound powder of myrrh, each half an ounce; canella alba, two drams; syrup of orange-peel, as

much as is sufficient. Mix, and make them into an electuary.

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tions.

This is a medicine of great power for promoting the natural evacuations from the uterus. It may be taken to the quantity of half a dram twice a-day.

914. *Nephritic electuary.*

Take of lenitive electuary, an ounce and a half; Venice turpentine, one ounce; egg-shells prepared (or prepared oyster-shells) half an ounce; choice rhubarb, one dram; syrup of marshmallows, as much as is sufficient. Dissolve the turpentine in the yolk of an egg; and then mix the whole together, according to art, so as to make thereof an electuary.

This composition is contrived for cleansing the urinary passage in nephritic disorders. A dram of the electuary may be taken once or twice a-day, along with an infusion of marshmallow roots, sweetened with a spoonful of honey.

915. *Paralytic electuary.*

Take of mustard seed, conserve of rosemary tops, each one ounce; compound spirit of lavender, two drams. Beat the mustard seed with a little water, that the pulp may be pressed thro' a hair sieve; then mix with it the conserve and the spirit.

This is a very efficacious medicine for paralytic disorders, tremors and numbness of the limbs, the decays accompanying old age, and in all cases where the solids require to be stimulated, or sluggish stagnant juices to be put in motion. It ought to be taken every morning and evening, or oftener, to the bulk of a large nutmeg, with a glass of rich wine, or any proper julep, after it.

916. *Electuary of Peruvian bark.*

1. Take of Peruvian bark, three ounces; cascarilla, half an ounce; syrup of orange-peel, a sufficient quantity.
2. Take of Peruvian bark, three ounces; Virginian snakeroot, one ounce; syrup of orange-peel, a sufficient quantity.
3. Take of Peruvian bark, three ounces; crude sal ammoniac, three drams; syrup of lemon-juice, a sufficient quantity.
4. Take of Peruvian bark, three ounces; colcothar of vitriol, six drams; simple syrup, a sufficient quantity.
5. Take of Peruvian bark, three ounces; alum, one ounce; syrup of lemon-juice, as much as is sufficient.
6. Take of extract of Peruvian bark, one ounce; extract of logwood, extract of liquorice, each half an ounce; mucilage of quince-seeds, as much as is sufficient to reduce the other ingredients into the consistence of an electuary.

All these compositions are very elegant, and efficacious in the intentions for which they are designed. The first is calculated for common intermittent fevers, in the cure of which the virtues of the bark are greatly assisted by the cascarilla. The second and third are given in those intermittents which happen in cachectic habits, and persons subject to obstructions of the viscera, where the bark by itself, on account of its great astringency,

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gency, would be prejudicial. The fourth is a good strengthener in laxities of the solids and decays of constitution; and the fifth, a powerful styptic in fluxes and hæmorrhages, particularly in the diabetes and fluor albus. The bulk of a nutmeg of each may be taken at a time, and repeated according to the exigency of the case. The sixth is a very agreeable form for the exhibition of Peruvian bark to those who are more than ordinarily offended with its taste; the substances here joined effectually covering its taste, at the same time that they coincide with it in virtue. The composition is a very elegant and pleasant one, and well deserves a place in the shops: it may either be given in the form of a bolus or electuary, in the dose of a dram or more; or dissolved in any suitable liquor into a draught.

917. *An acid purgative electuary.*

Take of pulp of tamarinds, two ounces; crystals of tartar, two drams. Make them into an electuary.

This is an useful cooling laxative in hot bilious dispositions, or inflammatory diseases. The bulk of a nutmeg may be taken every hour, or oftener, till it begins to operate, or the same quantity may be taken once a day occasionally in dry costive habits.

918. *Saponaceous electuary.*

Take of hard Spanish soap, two ounces; pareira brava, one ounce; rhubarb, gum of aloes, each three drams; syrup of orange-peel, a sufficient quantity. Mix and make them into an electuary.

This electuary is calculated for jaundices arising from an obstruction of the biliary ducts, or a viscosity of the bile itself: such are those which most commonly occur, in which the stools are of a whitish or ash-colour, and voided with difficulty. The dose is from half a dram to a dram, twice a day.

919. *Binding electuary.*

Take of the Japonic confection, two ounces; extract of logwood, one ounce; syrup of dry roses, as much as will reduce them into a proper consistence for an electuary.

This electuary is calculated for the relief of dysenteries, and other intestinal fluxes, after the acrid humours have been duly evacuated by mild cathartics, &c. The quantity of a nutmeg may be taken every four or five hours.

920. *Electuary of sulphur.*

Take of flowers of sulphur, half an ounce; lenitive electuary, two ounces; syrup of marshmallows, a sufficient quantity to make them into an electuary.

This electuary is designed against the piles, and generally distinguished in the hospitals by the title of *electuarium hæmorrhoidale*: where the disorder is accompanied with febrile or inflammatory symptoms, some nitre is occasionally added, in the proportion of two drams to the quantity here directed. It may be given from a dram to half an ounce at a time.

SECT. VI. *Lobochs.*

921. A LOBOCH, eclegma, linctus, or lambative, is a soft compound designed to be licked or slowly swallowed down, of a middle consistence between a syrup

and electuary, at least never so thin as the former, nor so thick as the latter.

These preparations are generally composed of expressed oils, mixed with syrups and other like substances. Two ounces of a syrup, a dram of sugar, and an ounce of expressed oil, form a linctus of a due consistence; which may be made thicker at pleasure by adding more oil, or thinner by an increase of the syrup.

The form is an inelegant one, and in the present practice is little regarded.

SECT. VII. *Emulsions.*

922. THE foregoing section respected compositions in which oils were united with watery liquors, by the mediation of sugar and syrups, into thick unctuous compounds. The present section contains mixtures of oily, resinous, and other like bodies, with water, in a liquid form, of a white colour resembling milk, and hence called *emulsions*.

Emulsions have been generally prepared by grinding the oily seeds of plants, or kernels of fruits, along with common water or any agreeable simple distilled water. In this process, the oil of the subject is, by the mediation of the other matter, united with the aqueous fluid: and hence they possess some share of the emollient virtue of the pure oil; with this advantage, that they are agreeable to the palate, and not apt to turn rancid or acrimonious by the heat of the body, which the pure oils in some inflammatory cases may do.

Emulsions, besides their use as medicines themselves, are excellent vehicles for certain substances which cannot otherwise be so conveniently taken in a liquid form. Thus camphor triturated with almonds, readily unites water into an emulsion, and in this form is conveyed into the remotest parts of the body, with sufficient efficacy to answer intentions of moment, at the same time that its heat and pungency are softened by the unctuousity of the almonds.

Pure oils, balsams, resins, and other similar substances, are likewise rendered miscible with water, into emulsions or milky liquors, by the intervention of mucilages. The white or yolk of an egg unites these bodies also with water, but less elegantly.

Several of the gummy resins, as ammoniacum, galbanum, myrrh, and others, are reducible to emulsions by trituration with water alone; their resinous part being rendered dissoluble by the mediation of the gummy.

923. *Common emulsions.*

Take of sweet almonds blanched, one ounce; gum arabic, half an ounce; double-refined sugar, six drams; barley water, two pints. Dissolve the gum in the barley water warmed; as soon as the water is grown thoroughly cold, pour it by little at a time upon the almonds and sugar, first beat together, continuing to grind the whole, that the liquor may grow milky; after which it is to be passed through a strainer. *L.* Take of sweet almonds, one ounce; bitter almonds, one dram; common water, two pints. Beat the almonds, after having blanched them, in a marble mortar, and gradually pour on them the common water. Then strain off the liquor. *E.*

924. *Arabic emulsion* is made after the same manner, by

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tions.

by adding, while the almonds are beating, two ounces and a half of mucilage of gum arabic.

Great care should be taken that the almonds are not become rancid by keeping; which will not only render the emulsion extremely unpleasant, a circumstance of great consequence in a medicine that requires to be taken in large quantities, but likewise give it injurious qualities little expected from preparations of this class. These liquors are principally made use of for diluting and obtunding acrimonious humours; particularly in heat of urine and stranguries, arising either from a natural sharpness of the juices, or the operation of cathartics or other irritating medicines: in these cases, they are to be drank frequently, in the quantity of half a pint or more at a time.

925. *A purging emulsion.*

Take of sweet almonds blanched, two drams; fine sugar, one dram; gum arabic, half a dram; scammony, 10 grains; simple cinnamon-water, one ounce. Dissolve the gum in the cinnamon water; and having ground the scammony with almonds and sugar, pour on the liquor by little at a time, continuing to grind them together, so as to make them into an emulsion.

This emulsion is an agreeable and effectual purgative. Some have employed an infusion of liquorice; which appears to be a very proper addition in these kinds of preparations, as it coincides with the almonds in correcting the irritating power of the purgative material.

926. *Emulsion with arum root.*

Take of fresh arum root, gum arabic, each two drams; spermaceti, two scruples; common water, five ounces; nutmeg-water, syrup of orange-peel, each half an ounce. Dissolve the gum arabic with a part of the water, into a mucilage, which is to be beaten with the spermaceti into a smooth paste. To this add the arum root, previously beaten by itself into a pulp; and rub them well together, that they may be thoroughly mixed. Then gradually pour in the waters and the syrup.

Fresh arum root may be taken in this form without the least inconvenience from the pungency with which the root itself so violently affects the mouth. A spoonful of the emulsion has been given every six hours, or oftener, in cases of the rheumatic kind, and generally with great benefit. The more immediate effect experienced from it is that of warming the stomach, and promoting sweat, which in some instances it does profusely.

SECT. VIII. *Juleps, Mixtures, and Draughts.*

927. By *julep* is commonly understood, an agreeable liquor, designed as a vehicle for medicines of greater efficacy, or to be drank after them, or to be taken occasionally as an auxiliary. In this light their basis is generally common water, or a simple distilled water, with one-fourth or one third its quantity of a distilled spirituous water: this mixture is sweetened with sugar or any proper syrup, or acidulated with vegetable or mineral acids, or impregnated with other medicines suitable to the intention; care being taken that these additions be such as will not render the compound unlighty or unpalatable. The quantity usually

directed at a time, in common prescription, is six or eight ounces, to be taken by spoonfuls.

928. A *mixture*, more strictly so called, receives more efficacious materials, whether soluble in water, as extracts or salts; or indissoluble, as powders; more regard being here had to the medicinal intention, than to the lightness or palatableness of the compound. There is indeed no precise distinction between the two; the same composition being often called by one a *julep*, and by another a *mixture*; though in general, few would give the name of *julep* to a very disagreeable liquor, or that of *mixture* to a very pleasant one.

929. A *draught* differs from a *julep* or *mixture* only in being prescribed in less quantity, the whole being intended for one dose.

930. *Chalk Julep.*

Take of the whitest chalk prepared, one ounce; double-refined sugar, six drams; gum arabic, two drams; water, two pints. Mix them together.

This *julep* is designed for heartburns and other like disorders arising from acid juices in the first passages.

931. *Musk julep. L.*

Take of damask-rose water, six ounces by measure; musk, 12 grains; double-refined sugar, one dram. Grind the sugar and musk together, and gradually add to them the rose-water.

This is an improvement upon the *hysteric julep* with *musk* of *Bates*, formerly in use.

932. *Cordial julep.*

Take of alexeterial water, four ounces; aromatic water, two ounces; volatile oily spirit, tincture of saffron, each two drams; white sugar, half an ounce. Mix, and make them into a *julep*.

This mixture is an useful cordial in all depressions of the spirits, in the sinkings of low fevers, and the languors to which hysterical and hypochondriacal persons are subject. An ounce, or two spoonfuls, may be taken for a dose, two or three times a day.

933. *Diaphoretic julep.*

Take of alexeterial water, four ounces; spirit of Mindererus, two ounces; salt of hartshorn, ten grains; white sugar, six drams. Mix them for a *julep*.

This excellent composition is a very powerful sudorific, and answers its intention more effectually, and with greater certainty, than many others calculated for the same purpose. Where a copious sweat is to be excited, as in rheumatic diseases, two spoonfuls are to be taken warm in bed every hour, or two hours, till the sweat breaks out; if warm diluting liquors are not afterwards sufficient to keep it up, the same medicine is to be occasionally repeated.

934. *Diuretic julep.*

Take of spirit of Mindererus, four ounces; compound horseradish water, two ounces; syrup of marshmallows, three ounces. Mix them together.

The spirit of Mindererus is an excellent aperient saline liquor, capable of promoting evacuation either by the cutaneous pores, or the urinary passages, according to the manner of exhibiting it. When taken warm in bed, it proves a powerful sudorific, especially if assist-

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ed by volatile salts, small doses of opiates, or other substances which tend to determine its action to the skin. If the patient walks about in a cool air, it operates gently, but for the most part effectually, by urine. The additions here joined to it correspond with this intention, and promote its operation. As this medicine excites the urinary discharge, without heating or irritating the parts, it takes place not only in dropsies, but likewise in inflammatory disorders, wherever this salutary secretion is to be promoted. It is given in the quantity of two spoonfuls thrice a-day.

935. *Fetid julep.*

Take of asafetida, one dram and a half; rue water, six ounces; compound valerian water, two ounces; oil of hartshorn, twenty drops; white sugar, ten drams. Rub the asafetida in the rue water till it dissolves; and having dropped the oil upon the sugar, mix the whole together.

This composition is not a little fetid and unsightly; it is nevertheless a medicine of great efficacy in hypochondriacal and hysterical disorders, asthma, and other nervous complaints: the dose is one spoonful, to be taken thrice a-day. It is sometimes prepared without the oil of hartshorn.

936. *Binding julep.*

Take of alexeterial water, four ounces; aromatic water, two ounces; Japonic confectio, two drams; Japan earth, in powder, one dram; liquid laudanum, forty drops; white sugar, half an ounce. Mix them well together.

This julep is calculated against dysenteries and diarrhoeas; in which, after proper evacuations, it generally eases the gripes, and restrains the flux. It is to be given three or four times a-day, in the quantity of a spoonful at a time.

937. *Antidysenteric mixture.*

1. Take of simple cinnamon-water, seven ounces; spirituous cinnamon-water, one ounce; electuary of scordium with opium, half an ounce. Mix them together.
2. Take of extract of logwood, three drams; tincture of Japan earth, two drams; spirituous cinnamon-water, one ounce; common water, seven ounces. Dissolve the extract in the cinnamon-water, and then add the common water and the tincture.

In recent dysenteries, after the necessary evacuations, a spoonful or two of either of these mixtures may be given after every motion, or once in four or five hours: if the first, which is a mild opiate, fails of procuring rest, it is a sign that some of the corrupted humours still remain in the bowels, and that it is more proper to go on with the evacuation than to suppress the flux. These medicines will sometimes likewise take place in the last stage of the disease, when thro' neglect or mismanagement it has continued till the strength is much impaired, the intestines greatly relaxed, and their villous coat abraded; provided there are neither ichorous or involuntary stools, apthæ, petechiæ, hiccup, or great anxiety at the breast. Rhubarb, and these astringents, are to be so interposed, that at the same time that the putrid humours are dis-

lodged, the strength may be supported, and the intestines braced.

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tions.938. *Cordial mixture.*

Take of simple cinnamon-water, four ounces; spirituous cinnamon-water, two ounces; extract of saffron, one scruple; confectio of kermes, six drams. Mix them together.

In great languors and depressions, a spoonful of this rich cordial mixture may be taken every half hour.

939. *Mixture against the phthisis.*

1. Take of balsam of copaiba, one dram; common water, four ounces; spirituous cinnamon-water, one ounce. Syrup of orange-peel, half an ounce. Let the balsam be dissolved in a proper quantity of yolk of egg, and then mixed with the other ingredients.
2. Take of thebaic extract, one grain; conserve of roses, half a dram. Mix them together for a bolus.
3. Take of oxymel of squills, a dram and a half; thebaic tincture, fifteen drops; spirituous cinnamon-water, two drams; common water, two ounces. Mix them together.

In the advanced state of a consumption, we may distinguish two sorts of coughs, one occasioned by the ulcers, and the other by a thin rheum falling upon the fauces and trachea; which parts, being then deprived of their mucus, become extremely sensible to irritation. It is this last kind, perhaps, which is most painful and teasing to the patient. The first sort requires balsamics, if the ulcer is open, and the matter can be expectorated. For this purpose, the first of the above mixtures is a very elegant and effectual formula; two spoonfuls are to be taken at a time twice a-day: if the balsam purges, two drams of the pargoric elixir, added to the quantity of the mixture here prescribed, will prevent that effect. The other kind of cough can only be palliated by inexpectants; and for that purpose, the second of the above compositions is one of the most successful medicines: the conserve is altogether safe, and otherwise well adapted to the nature of the disease, but of weak virtues: the opiate extract is the most efficacious ingredient, but is to be given with great caution, as opiates in general are apt to heat, to bind the body, and to obstruct expectoration. As these bad qualities are in good measure corrected by squills, as soon as the patient begins to complain of restless nights from coughing, the third mixture may be given at bed-time.

940. *Valerian mixture.*

Take of simple peppermint-water, twelve ounces; wild valerian-root, in powder, one ounce; compound spirit of lavender, half an ounce; syrup of orange-peel, one ounce. Mix them together.

Wild valerian root, one of the principal medicines in epilepsies and vertiges, seems to answer better when thus exhibited in substance, than if given in form of tincture or infusion. The liquors here joined to it excellently coincide with, and by their warmth and pungency greatly improve, its virtues. Two spoonfuls of the mixture may be taken twice or thrice a-day.

941. *Cathartic draught.*

Take of jalap, in powder, one scruple; ipecacoanha, three

three grains; compound juniper-water, one ounce; infusion of lintseed, an ounce and a half; simple syrup, one dram. Mix them together.

This is a strong cathartic; yet for the most part easy and safe in operation. It is calculated chiefly for hydropic cases; in which it procures copious evacuations, without weakening or fatiguing the patient so much as many other medicines of this kind.

942. *Saline cathartic draught.*

Take of Glauber's cathartic salt, manna, each six drams; boiling water, three ounces; tincture of cardamoms, one dram. Dissolve the salt and manna in the water; and having strained off the liquor, add to it the tincture of cardamoms.

This is a very elegant and agreeable saline purgative. Tincture of cardamoms is one of the best additions to liquors of this kind, or to the purging mineral waters, for rendering them acceptable to the stomach.

943. *Diaphoretic draught.*

Take of spirit of Mindererus, spirit of meconium, each half an ounce; salt of hartshorn, five grains. Mix them together.

This draught is a very powerful saline diaphoretic. It is given with safety, and often with great benefit, in the beginning of inflammatory fevers, after bleeding; where theriaca, and other warm substances usually employed, if they fail in bringing out a sweat, increase the fever.

944. *Diuretic draught.*

1. Take of oxymel of squills, one dram and a half; simple cinnamon-water, one ounce; compound spirit of lavender, syrup of orange-peel, each one dram. Mix them together.
2. Take of vinegar of squills, one dram, or one dram and a half; salt of wormwood, half a dram; lemon-juice, six drams; simple cinnamon-water, an ounce and a half; spirituous peppermint-water, half an ounce; syrup of orange-peel, one dram. Let the salt of wormwood and lemon-juice be first mixed together, and then add to them the other ingredients.

These elegant and efficacious compositions are commended by Dr Mead for promoting urine in hydropic cases. He directs them to be taken every night, or oftener, according to the urgency of the symptoms. The squill, one of the most powerful diuretics, is, by the additions here joined to it, rendered not only more grateful to the palate and stomach, but likewise enabled more effectually to answer the purposes intended by it.

945. *An anodyne diuretic draught.*

Take of ley of tartar, half a dram; thebaic tincture, forty drops; peppermint-water, one ounce; simple cinnamon-water, half an ounce; spirituous cinnamon-water, two drams; syrup of marshmallows, one dram. Mix them together.

Though practitioners have rarely ventured to exhibit opium in dropsies; yet in those which are accompanied with great pain, this anodyne drug, by easing the pain, and removing the stricture of the passages,

which painful sensations always occasion, proves a medicine of great service, and notably promotes the urinary discharge. Dr Mead has given a remarkable instance of the good effects of the mixture above prescribed, in a person labouring under an ascites and tympany at the same time, where the pain was intolerable, the thirst intense, and the urine in very small quantity: the stronger purgatives increased the distemper; soap, alkaline salts, nitre, and other diuretics, were tried in vain: this draught (when the patient seemed to be beyond any assistance from medicine) procured unexpected relief, not only a gentle sleep, and truce from the pain, but likewise a copious discharge of urine: by repeating the medicine for a little time, every eight hours, and afterwards using corroborants, the cure was perfectly completed.

SECT. IX. *Lotions, Gargarisms, Injections, &c.*

946. *Bater's alum water. L.*

Take of alum, white vitriol, each half an ounce; water, two pints. Boil the salts in the water till they are dissolved; let the solution settle, and afterwards filter it through paper.

This liquor is used for cleansing and healing ulcers and wounds, and for removing cutaneous eruptions, the part being bathed with it hot three or four times a-day. It is sometimes likewise employed as a collyrium; and as an injection in the gonorrhoea and fluor albus, when not accompanied with virulence.

947. *Alum water. E.*

Take of corrosive mercury sublimata, alum, each two drams; water, two pints. Let the sublimata and alum be ground into powder, and boiled with water in a glass vessel to the consumption of half the water; then suffer the liquor to settle, and pour it off clear from the sediment.

This composition is designed chiefly for cutaneous pustules and ulcerations.

948. *Sapphire-coloured water.*

Take of lime-water, one pint; sal ammoniac, one dram. Let them stand together in a copper vessel, or along with some plates of copper, until the liquor has acquired a sapphire colour. L.

Take of lime-water newly made, half a pint; sal ammoniac, two scruples; powdered verdigrease, four grains. Mix and strain after 24 hours. E.

This water is at present pretty much in use, as a detergent of foul and obdurate ulcers, and for taking away specks or films in the eyes.

949. *Blue vitriolic water. L.*

Take of blue vitriol, three ounces; alum, strong spirit (or oil) of vitriol, each two ounces; water, a pint and a half. Boil the salts in the water, until they are dissolved; then add the acid spirit, and filter the mixture through paper.

950. *Styptic water. E.*

Take of blue vitriol, alum, each three ounces; water, two pints. Boil them until the salts are dissolved, then filter the liquor, and add an ounce of oil of vitriol.

These compositions are formed upon the styptic recommended by Sydenham, for stopping bleeding at the nose, and other external hemorrhages: for this purpose, cloths or doffils are to be dipt in the liquor, and applied to the part.

951. *Vitriolic water.* E.

Take of white vitriol, two drams; water, two pints. Boil till the vitriol is dissolved, and then filter the liquor.

Where the eyes are watery or inflamed, this solution of white vitriol is a very useful application: the slighter inflammations will frequently yield to this medicine, without any other assistance; in the more violent ones, venesection and cathartics are to be premissed to its use.

952. *Astringent gargarism.*

Take of oak-bark, one ounce; alum, one dram; honey of roses, one ounce; water, a pint and a half. Boil the water with the oak-bark, till such time as the liquor, when strained, will amount only to one pint; to which add the alum and the honey.

953. *Common gargarism.*

Take of tincture of roses, one pint; honey of roses, two ounces. Mix them together. Or, Take of water, six ounces; nitre, one dram; honey of roses, one ounce. Mix them together. Where acids are requisite, forty drops of the weak spirit of vitriol are added to this composition.

954. *Detergent gargarism.*

Take of emollient decoction, one pint; tincture of myrrh, one ounce; honey, an ounce and a half. Mix them together.

955. *Emollient gargarism.*

Take of marshmallow root, two ounces; figs, four in number; water, three pints. Boil them till one pint is wasted, and then strain the liquor.

These liquors are used for washing the mouth and fauces; the first, where the parts are extremely relaxed; the second and third, where ulcerations require to be deterged, or the excretion of the thick viscid saliva promoted; and the fourth, where the mouth is dry, parched and rigid, to moisten and soften it. In some cases, volatile spirits may be advantageously joined to these kinds of preparations. Dr Pringle informs us, that in the inflammatory quinsy, or strangulation of the fauces, he has observed little benefit arising from the common gargles: that such as were of an acid nature seemed to do more harm than good, by contracting the emunctories of the saliva and mucus, and thickening those humours: that a decoction of figs in milk and water seemed to have a contrary effect, especially if some spirit of sal ammoniac was added, by which the saliva was made thinner, and the glands brought to secrete more freely; a circumstance always conducive to the cure.

956. *Starch glyster.*

Take of gelly of starch, four ounces; linseed oil, half an ounce. Liquefy the gelly over a gentle fire, and then mix in the oil. Forty drops of liquid laudanum, are sometimes added.

957. *Anodyne or opiate glyster.*

Take of infusion of linseed, six ounces; liquid laudanum, forty drops. Or, Mutton-broth, five ounces; thebaic extract, three grains.

958. *Glyster against the colic.*

Take of common decoction, half a pint; tinctura sacra, one ounce; common salt, one dram; linseed oil, two ounces. Mix them together.

959. *Astringent glyster.*

Take of lime-water, ten ounces; Japonic confection, half an ounce. Mix them together for a glyster, of which one half is to be injected at a time.

960. *Astringent balsamic glyster.*

This is made by adding to the foregoing half an ounce of Locatelli's balsam, dissolved in the yolk of an egg.

961. *Common glyster.*

Take of common decoction, twelve ounces; lenitive electuary, one ounce; common salt, half an ounce; oil-olive, two ounces. Mix them together.

962. *Domestic glyster.*

Take of cows milk, half a pint; brown-sugar, oil-olive, each one ounce. Mix them together.

963. *Emollient glyster.*

Take of palm-oil, an ounce and a half; cows milk, half a pound. Let the oil be beat up with the yolk of one egg, and then add the milk.

964. *Fetid glyster.*

Take of asafetida, two drams; rue, favin, each half an ounce; oil-olive, one ounce; oil of Amber, half a dram; water, one pint and a half. Boil the water with the rue and favin, till half a pint is wasted; then strain off the remaining decoction, and mix with it the asafetida and the oils. Half the quantity of the composition here directed, is to be injected at a time.

965. *Purging glyster.*

Take of common decoction, half a pint; white soap, one ounce; syrup of buckthorn, an ounce and a half. Mix them together.

966. *Turpentine glyster.*

Take of common decoction ten ounces; Venice turpentine (dissolved in the yolk of an egg), half an ounce; linseed oil, one ounce. Mix them together.

The uses of these compositions are sufficiently obvious from their titles. The starch, anodyne, emollient, and astringent glysters, are used in dysenteries, and other alvine fluxes, to strengthen the tone of the intestines, defend them from being corroded by the acrimonious humours, to heal their excoriated, and ease the pains which accompany these disorders. The turpentine glyster is injected in nephritic cases; the fetid in hystERIC ones. The others are calculated for unloading the intestines of their contents, where the exhibition of purgatives in other forms is improper or unsafe.

Glysters have been looked upon by some as mere topical applications, whose operation was confined to

to the intestines, into which they are received. But experience has shewn, that in many cases their action is extended much farther: thus the turpentine glyster, above described, promotes the discharge by the kidneys, and communicates to the urine a violet smell; and the anodyne glyster proves narcotic, as if a moderate dose of opium had been swallowed: Persons have been inebriated by spirituous glysters; and some affirm, that life has been supported for several days, by those of a nutritious kind.

967. Balsamic injection.

Take of balsam of Copaiba, half an ounce; lime-water, six ounces; honey of roses, two ounces. Let the balsam be well beaten up with the yolk of one egg; and then gradually add the lime-water and honey.

968. Mercurial injection.

Take of quicksilver, balsam of Copaiba, each half an ounce; rose-water, half a pint. Rub the quicksilver with the balsam, till they are perfectly incorporated; then mix with them the yolk of an egg, and afterwards add the rose-water.

This and the foregoing preparation are designed to be injected into the urethra in virulent gonorrhœas, for cleansing and deterring the parts.

SECT. X. Plasters.

969. PLASTERS are composed chiefly of oily and unctuous substances, united with powders, into such a consistence, that the compound may remain firm in the cold, without sticking to the fingers; that it may be soft and pliable in a small heat; and that by the warmth of the human body it be so tenacious, as readily to adhere both to the part on which it is applied, and to the substance on which it is spread.

There is however a difference in the consistence of plasters, according to the purposes they are to be applied to: thus, such as are intended for the breast and stomach, should be very soft and yielding; whilst those designed for the limbs are made firmer and more adhesive. An ounce of expressed oil, an ounce of yellow wax, and half an ounce of any proper powder, will make a plaster of the first consistence; for a hard one, an ounce more of wax, and half an ounce more of powder, may be added. Plasters may likewise be made of resins, gummy-resins, &c. without wax, especially in extemporaneous prescription: for officinals, these compositions are less proper, as they soon grow too soft in keeping, and fall flat in a warm air.

Calces of lead, boiled with oils, unite with them into a plaster of an excellent consistence, and which makes a proper basis for several other plasters.

In the boiling of these compositions, a quantity of water must be added, to prevent the plaster from burning and growing black. Such water, as it may be necessary to add during the boiling, must be previously made hot: for cold liquor would not only prolong the process, but likewise occasion the matter to explode, and be thrown about with violence, to the great danger of the operator: this accident will equally happen upon the addition of hot water, if the plaster is extremely hot.

970. Anodyne plaster. E.

Take of white resin, eight ounces; tacamahaca in powder, galbanum, each four ounces; cummia in seeds, three ounces; black soap, four ounces. Melt the resin and the gums together; then add the powdered seeds and the soap, and make the whole into a plaster.

This plaster generally gives ease in slight rheumatic pains, which it is supposed to effect by preventing the afflux of humours to the part, and putting in motion and repelling such as already stagnate there.

971. Antihysteric plaster. E.

Take of strained galbanum, one pound; strained asphaltida, yellow wax, of each half a pound; yellow resin, three ounces. Melt them together into a plaster.

This plaster is applied to the umbilical region, or over the whole abdomen, in hysterical cases, and sometimes with good effect.

972. Drawing plaster. L.

Take of yellow resin, yellow wax, each three pounds; tried mutton-suet, one pound. Melt them together; and whilst the mass remains fluid, pass it through a strainer.

This is a very well contrived plaster for the purpose expressed in its title. It is calculated to supply the place of melilot plaster; whose great irritation, when employed for the dressing of blisters, has been continually complained of. This was owing to the large quantity of resin contained in it, which is here for that reason retrenched. It should seem, that, when designed only for dressing blisters, the resin ought to be entirely omitted, unless where a continuance of the pain and irritation excited by the vesicator is required. Indeed plasters of any kind are not very proper for this purpose: their consistence makes them fit uneasy, and their adhesiveness renders the taking them off painful. Cerates, which are softer and less adhesive, appear much more eligible: the *white cerate* (n° 1019.) will serve for general use, and for some particular purposes the *yellow cerate* (n° 1030.) may be applied.

973. Wax plaster. E.

Take of yellow wax, two pounds; white resin, half a pound; hog's lard, one pound. Melt them together into a plaster.

This plaster is similar to the foregoing, but the further reduction of the resin renders it for some purposes more eligible.

974. Cephalic plaster.

Take of Burgundy pitch, two pounds; soft labdanum, one pound; yellow resin, yellow wax, each four ounces; the expressed oil, called *oil of mace*, one ounce. Melt the pitch, resin, and wax, together; then add, first the labdanum, and afterwards the oil of mace. L.

Take of tacamahaca in powder, yellow wax, Venice turpentine, each four ounces; oil of lavender, two drams; oil of amber, one dram. Melt the tacamahaca

haca with the wax; and then add the turpentine, that a plaster may be formed: when this compound is taken from the fire, and grown almost cold, mix in the oils. *E.*

These plasters are applied, in weakness or pains of the head, to the temples, forehead, &c. and sometimes likewise to the feet. Schulze relates, that an inveterate rheumatism in the temples, which at times extended to the teeth, and occasioned intolerable pain, was completely cured in two days by a plaster of this kind (with the addition of a little opium) applied to the part, after many other remedies had been tried in vain: he adds, that a large quantity of liquid matter exuded, under the plaster, in drops, which were so acrid as to corrode the cuticle.

975. *Common plaster, usually called diachylon.*

Take of oil-olive, one gallon; litharge, ground into a most subtle powder, five pounds. Boil them over a gentle fire, with about two pints of water; keeping them continually stirring, till the oil and litharge unite, and acquire the consistence of a plaster. If all the water should be consumed before this happens, add some more water, previously made hot. *L. E.*

This plaster is the common application in excoriations of the skin, slight flesh wounds, and the like. They keep the part soft, and somewhat warm, and defend it from the air, which is all that can be expected in these cases from any plaster. Some of our industrious medicine-makers have thought these purposes might be answered by a cheaper composition, and accordingly have added a large quantity of common whitening and hog's lard; this, however, is by no means allowable, not only as it does not stick so well, but likewise as the lard is apt to grow rancid and acrimonious. The counterfeit is distinguishable by the eye.

976. *Common sticking plaster.*

Take of common plaster, three pounds; yellow resin, half a pound. Melt the common plaster over a very gentle fire; then add the resin, first reduced into powder, that it may melt the sooner; and mix them all together.

This plaster may otherwise be made, by taking, instead of the common plaster, its ingredients oil and litharge, and adding the resin a little before they have come to the due consistence; then continue the boiling, till the plaster is finished. It turns out the most elegant when made by this last method.

977. *Sticking plaster. E.*

Take of common plaster, two pounds; yellow resin, five ounces. Melt them together, so as to make a plaster.

These plasters are used chiefly as adhesives, for keeping on other dressings, &c.

978. *Common plaster, with gums. L.*

Take of common plaster, three pounds; galbanum strained, eight ounces; common turpentine, frankincense, each three ounces. Melt the galbanum with the turpentine over a gentle fire, and sprinkle in the frankincense reduced to powder: then gradually mix with these the common plaster, previous-

ly liquefied by a very gentle heat. Or, instead of the common plaster already made, you may take the oil and litharge boiled together: as soon as these unite, before they have acquired the consistence of a plaster, the other ingredients are to be added.

979. *Gum plaster. E.*

Take of gum ammoniacum strained, galbanum strained, each three ounces; common plaster, two pounds. Mix them together into a plaster.

Both these plasters are used as digestives and suppuratives; particularly in abscesses, after a part of the matter has been maturated and discharged, for suppurating or discharging the remaining hard part.

980. *Cummin plaster. L.*

Take of Burgundy pitch, three pounds; yellow wax, cummin seeds, caraway seeds, bay-berries, each three ounces. Melt the pitch with the wax; then sprinkle in the other ingredients first reduced into a powder, and mix the whole well together.

This plaster stands recommended as a moderately warm discutient; and is directed by some to be applied to the hypogastric region, for strengthening the viscera, and expelling flatulencies.

981. *Defensive plaster. E.*

Take of common plaster, two pounds; yellow wax, yellow resin, of each three ounces; colcothar of vitriol, six ounces. Boil the oil with the litharge, till they have acquired nearly the consistence of a plaster: in this liquefy the wax, and then add the other ingredients, so as to form the whole into a plaster, according to art.

This plaster is laid round the lips of wounds and ulcers, over the other dressings, for defending them from inflammation, and a fluxion of humours; which, however, as Mr Sharp very justly observes, plasters, on account of their consistence, tend rather to bring on than to prevent.

982. *Melilot plaster.*

The London college has substituted to the plaster of this name, the *drawing plaster*, (n° 972.); the Edinburgh the *wax plaster*, (n° 973.)

983. *Mercurial plaster. E.*

Take of common plaster, a pound and a half; quicksilver eight ounces; Venice turpentine, two ounces and a half. Grind the quicksilver in a mortar, with the turpentine, until they are perfectly incorporated; and then, having melted the common plaster, and taken it from the fire, add to it this mixture.

This plaster is looked on as a powerful resolvent and discutient, acting with much greater certainty in these intentions than any composition of vegetable substances alone; the mercury exerting itself in a considerable degree, and being sometimes introduced into the habit in such quantity as to affect the mouth. Pains in the joints and limbs from a venereal cause, nodes, topes, and beginning indurations of the glands, are said sometimes to yield to them.

984. *Strengthening plaster. L.*

Take of common plaster, two pounds; frankincense, half a pound; dragons blood, three ounces. Melt the

the common plaster, and add to it the other ingredients reduced into powder. The dragons blood should be reduced to a very fine powder, otherwise the mixture will not be of an uniform colour.

This is a reformation of the laborious and injudicious composition described in preceding pharmacopœias, under the title of *Emplastrum ad herniam*; and though far the most elegant and simple, is as effectual for that purpose as any of the medicines of this kind. If constantly worn, with a proper bandage, it will, in children, frequently do service; though perhaps not so much from any strengthening quality of the ingredients, as from its being a soft, close, and adhesive covering.

985. *Saponaceous plaster.* E.

Take of gum plaster, one pound; Castile soap, sliced, nine ounces; common plaster, two pounds. Melt the plaster, and then put in the soap, letting the whole boil for a short time, that it may become a plaster.

986. *Stomach plaster.*

Take of soft labdanum, three ounces; frankincense, one ounce; cinnamon, the expressed oil, called *oil of mace*, each half an ounce; essential oil of mint, one dram. Having melted the frankincense, add to it, first the labdanum softened by heat, and then the oil of mace; afterwards mix these with the cinnamon and oil of mint; and beat them together in a warm mortar, into a mass, which is to be kept in a close vessel. L.

This is a very elegant stomach plaster. It is contrived so as to be easily made occasionally (for these kinds of compositions, on account of their volatile ingredients, are not fit for keeping;) and to be but moderately adhesive, so as not to offend the skin; and that it may without difficulty be frequently taken off and renewed, which these sorts of applications, in order to their producing any considerable effect, require to be.

Take of yellow wax, eight ounces; tacamahaca in powder, four ounces; cloves, powdered, two ounces; palm-oil, six ounces; expressed oil of mace, an ounce and a half; essential oil of mint, two drams. Melt the wax and tacamahaca with the palm-oil; then removing the mixture from the fire, add the other ingredients, and make them into a plaster, according to art. E.

These plasters are applied to the pit of the stomach, in weakness of that viscus, in vomitings, in the disorder improperly called the *heartburn*, &c. and sometimes with good success. The pit of the stomach, however, as Hoffman has observed, is not always the most proper place for applications of this kind to be made to: if applied to the five lower ribs of the left side, towards the back, the stomach will in general receive more benefit from them; for it appears from anatomical inspection, that greatest part of it is situated there.

987. *Blistering plaster.* L.

Take of drawing plaster, two pounds; cantharides, one pound; vinegar, half a pint. Melt the drawing plaster; and, a little before it grows stiff, mix in the cantharides, reduced into a most subtle powder:

then add the vinegar, and work them well together.

Take of yellow wax, two pounds; yellow rosin, hog's-lard, of each one pound; oil olive, half a pint; cantharides, a pound and a half. Reduce the cantharides first to a very fine powder, then rub them with the oil; and having melted the other ingredients with a gentle heat, add the cantharides to them when pretty cold. E.

988. *An anodyne and discutient plaster.*

Take of cummin plaster, two ounces; camphor, three drams; Thebaic extract, one dram and a half. Grind the camphor, with some drops of oil olive, into a very subtle powder; and then mix it with the other ingredients, according to art, into a plaster.

989. *Warm plaster.*

Take of gum plaster, one ounce; blistering plaster, two drams. Melt them together over a gentle fire.

990. *Suppurating plaster.*

Take of gum plaster, an ounce and a half; Burgundy pitch, half an ounce. Melt them together.

The uses of the three foregoing compositions, which are taken from our hospitals, are sufficiently obvious from their titles. The warm plaster is a very stimulating application, of great use in fixed pains, as in the rheumatism, sciatica, beginning chilblains, &c.

SECT. XI. *Ointments, Liniments, and Cerates.*

991. *Ointments and liniments* differ from plasters little otherwise than in consistence. Any of the officinal plasters, diluted with so much oil as will reduce it to the thickness of Riff honey, forms an ointment: by farther increasing the oil, it becomes a liniment. *Cerates* differ from plasters and ointments only in consistence; being a softer kind of plaster, or harder kind of ointment.

992. *Ointment of verdigris.* E.

Take of white wax, yellow resin, of each two ounces; of oil olive, a pint; verdigris, half an ounce. Having melted the wax and resin with the oil, add the verdigris first ground with a little of the oil, keeping the whole constantly stirring till cold.

993. *Mel Ægyptiacum.* L.

Take of verdigris, reduced into a very subtle powder, five ounces; honey, 14 ounces by weight; vinegar, seven ounces by measure. Boil these ingredients together, over a gentle fire, till they have acquired a due consistence and a reddish colour. On keeping this mixture for some time, the thicker part falls to the bottom; the thinner, which floats on the top, is called *mel Ægyptiacum*.

These preparations are designed only for external use, for cleansing and deterring ulcers, and keeping down fungous flesh: they are serviceable also in venereal ulcerations of the mouth and tonsils. If for particular purposes, the latter should be wanted more acrid, it may be occasionally rendered so by shaking the vessel, so as to mix up the thick matter at the bottom (which contains greatest part of the verdigris) with the upper thin one.—In the former the verdigris is sometimes doubled.

994. *White*

994. *White ointment.* L. E.

Take of oil olive, one pint; white wax, four ounces; spermaceti, three ounces. Liquefy them by a gentle fire, and keep them constantly and briskly stirring, till grown thoroughly cold.

995. *Ointment of white lead, commonly called white ointment.* E.

Take of oil olive, three pints; cerusse, one pound; white wax, nine ounces. Melt the wax in the oil: then gradually add the cerusse, and stir them well together, that they may be thoroughly mixed into an ointment.

This is an useful, cooling, and emollient ointment, of good service in excoriations, and other like frettings of the skin.

996. *Camphorated white ointment.* L.

This is made by adding to the white ointment a dram and a half of camphor, previously ground with some drops of oil of almonds,

This ointment is supposed to be more discutient than the foregoing, and serviceable against cutaneous heats, itching, and lerpiginous eruptions. It should be kept in close vessels, otherwise the camphor will soon exhale: smelling strong of this ingredient is the best mark of its goodness.

997. *Ointment of marsh-mallows.* L.

Take oil of mucilages, three pints; yellow wax, one pound; yellow resin, half a pound; common turpentine, two ounces. Melt the resin and wax with the oil: then, having taken them from the fire, add the turpentine; and while the mixture remains hot, strain it.

998. *Yellow basilicum ointment.*

Take of oil olive, one pint; yellow wax, yellow resin, Burgundy pitch, each one pound; common turpentine, three ounces. Melt the wax, resin, and pitch, along with the oil, over a gentle fire; then take them from the fire, add the turpentine, and whilst the mixture remains hot strain it. L.

Take of yellow wax, yellow resin, each two ounces; hog's-lard and oil olive, of each one pound. Melt them together with a gentle fire, and having removed them from it, stir them well till they grow cold. E.

These are commonly employed, in dressings, for digesting, cleansing, and incarnating wounds and ulcers. They differ very little, if at all, in their effects, from the liniment of *Arceus*, (n° 1015.)

999. *Black basilicum ointment, or ointment of four ingredients.* L.

Take of oil olive, one pint; yellow wax, yellow resin, dry pitch, each nine ounces. Melt them all together; and whilst the mixture is hot, strain it off.

This ointment was formerly of considerable esteem for healing and incarnating wounds, &c. but is said to have an inconvenience of being apt to render them foul, and produce fungous flesh: at present it is rarely made use of; the yellow basilicum, and the liniment of *Arceus*, being in general preferred.

1000. *Green basilicum ointment.* L.

Take of yellow basilicum, eight ounces; oil olive, three ounces by measure; verdigris prepared, one ounce. Mix, and make them into an ointment.

This ointment is an efficacious detergent.

1001. *Yellow ointment.* E.

Take of quicksilver, one ounce; spirit of nitre, two ounces; hogs-lard, tried, one pound. Dissolve the quicksilver in the spirit of nitre by digestion in a sand-bath; and whilst the solution is very hot, mix with it the lard, previously melted by itself, and just beginning to grow stiff. Stir them briskly together, in a marble mortar, so as to form the whole into an ointment.

1002. *The stronger blue ointment.* L.

Take of hogs-lard, tried, two pounds; quicksilver, one pound; simple balsam of sulphur, half an ounce. Grind the quicksilver with the balsam of sulphur till they are perfectly incorporated; then gradually add the lard heated, and mix them carefully together.

1003. *The milder blue ointment.* L.

Take of hogs-lard, tried, four pounds; quicksilver, one pound; common turpentine, one ounce. Grind the quicksilver with the turpentine, in a mortar, till it ceases to appear; then gradually add the lard warmed, and carefully mix them together.

This last unguent turns out of a much better blue colour than the foregoing, which is of a very dingy hue. Mercurial unguents have in many cases the same effect with the preparations of this mineral taken internally; and are at present frequently employed, not only against cutaneous disorders, as alterants, but likewise in venereal and other obstinate cases, for raising a salivation. The ptyalism excited by unction is said to be attended with the fewest inconveniences, and to perform the most complete cure. In some constitutions, mercurials taken inwardly, run off by the intestines, without affecting the mouth; and in others, they affect the salivary glands so quickly, as to occasion a copious ptyalism, without extending their action to the remoter parts, and consequently without removing the cause of the disease.

1004. *Ointment of gum elemi.* L.

Take of mutton-suet, fresh and tried, two pounds; gum elemi, one pound; common turpentine, ten ounces. Melt the gum with the suet; and having taken them from the fire, immediately mix the turpentine; then whilst the mass remains fluid, strain it off.

1005. *The ointment, commonly called liniment of Arceus.* E.

Take of hogs-lard, one pound; goats suet, or mutton suet, two pounds; Venice turpentine, gum elemi, each a pound and a half. Melt and strain them, so as to make an ointment according to art.

This unguent has long been in use for digesting, cleansing, and incarnating; and for these purposes is preferred by some to all the other compositions of this kind.

1006. *Emollient ointment.* E.

Take of palm oil, four pints; fresh-drawn linseed oil, three

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three pints; yellow wax, one pound. Melt the wax in the oils, over a gentle fire, and strain the ointment, which supplies the place of the ointment of *marshmallows*.

1007. *Mercurial ointment.* E.

Take of hogs lard, three ounces; mutton-suet, one ounce; quicksilver, one ounce. Rub them diligently together in a mortar, till the mercurial globules disappear. This ointment is made also with twice, and with thrice, the quantity of mercury.

This is the most simple of the mercurial ointments, though possibly as efficacious as any. It requires indeed a great deal more labour to extinguish the mercury in the lard alone, than when turpentine or other like substances are joined: but, in recompence, the composition with lard is free from an inconvenience which the others are accompanied with, viz. being apt by frequent rubbing to fret tender skins.

1008. *Ointment of mercury precipitate.* L.

Take of simple ointment, an ounce and a half; precipitated sulphur, two drams; white mercury precipitate, two scruples. Mix them well together, and moisten them with ley of tartar, that they may be made into an ointment.

This is a very elegant mercurial ointment, and frequently made use of against cutaneous disorders.

1009. *Ointment of tar.* L. E.

Take of mutton-suet tried, tar, each equal weights. Melt them together, and strain the mixture whilst hot.

This composition, with the addition of half its weight of resin, has long been used in the shops as a cheap substitute to the black basilicum.

1010. *Saturnine ointment.*

Take of oil olive, half a pint; white wax, an ounce and a half; sugar of lead, two drams. Let the sugar of lead, reduced into a very subtle powder, be ground with some part of the oil, and the wax melted with the rest of the oil. Mix both together, and keep them stirring till the ointment is grown cold. L.

Take of sugar of lead, half an ounce; white wax, three ounces; oil olive, one pint. Liquefy the oil and wax together, and gradually add the sugar of lead, previously ground, with some of the oil; continually stirring them, till, growing cold, they unite into an ointment. E.

Both these ointments are useful coolers and desiccatives.

1011. *The simple ointment.* L.

Take of hogs-lard, tried, two pounds; rose-water, three ounces by measure. Beat the lard with the rose-water, till they are well mixed; then melt them over a very gentle fire, and set them by for some time, that the water may subside: pour the lard off from the water, and keep incessantly stirring and beating it about till it grows cold, so as to reduce it into a light incoherent mass: lastly, add so much essence of lemons as will be sufficient to give a grateful odour.

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1012. *The rose ointment, commonly called pomatum.* E. On any quantity of hogs-lard, cut into small pieces, and placed in a glazed earthen vessel, pour as much water as will rise above it some inches; and digest them together for ten days, renewing the water every day. Then liquefy the lard with a very gentle heat, and pour it into a proper quantity of rose-water: work them well together; and afterwards pouring off the water, add to the lard some drops of oil of rhodium.

These ointments are in common use for softening and smoothing the skin, and healing chaps.

1013. *Ointment of tutty.* L.

Let any quantity of prepared tutty be mixed with as much purified vipers fat as is sufficient to reduce it into the consistence of a soft ointment.

This ointment is designed for an ophthalmic. What particular virtues it receives from the vipers fat, we shall not presume to determine.

In the present edition of the Edinburgh dispensatory, it is ordered to be made of four ounces of hog's lard, a dram of white wax, and an ounce of prepared tutty.

1014. *Ointment for blisters.*

Take of hog's-lard tried, blistering plaster, each equal weights. Melt them together over a very gentle fire, and keep them constantly stirring till grown cold. L.

Take of oil olive, one pint; yellow wax, four ounces; yellow resin, two ounces; cantharides, an ounce and a half. Melt the wax and resin over a gentle fire with part of the oil; then having taken them off the fire, add the cantharides first finely powdered, and then ground with part of the oil, continually stirring the mixture till it has grown cold. E.

1015. *The milder epispastic ointment.* E.

Take of cantharides, one ounce; white resin, yellow wax, each one ounce; hog's-lard, Venice turpentine, each two ounces; boiling water, four ounces. Infuse the cantharides in the water, in a close vessel, for a night; then strongly press out, and strain the liquor, and boil it with the lard till the watery moisture is consumed; then add the resin, wax, and turpentine, and make the whole into an ointment.

These ointments are added in the dressings for blisters, intended to be made *perpetual*, as they are called, or to be kept running for a considerable time, which in many chronic, and some acute cases, they are required to be.

The last, containing the soluble parts of the cantharides uniformly blended with the other ingredients, is more commodious, and occasions less pain, though not less effectual in its intention than the other with the fly in substance.

1016. *White liniment.* L.

Take of oil olive, three ounces by measure; spermaceti, six drams; white wax, two drams. Melt them together over a gentle fire, and keep them constantly and briskly stirring till grown cold.

This differs only in consistence from the *white ointment*, 994.

34 N

1017. *Green*

1017. *Green balsam.* E.

Take of linseed oil, oil of turpentine, each one pound; verdigris, in powder, three drams. Boil and stir them well together till the verdigris is dissolved.

A balsam, similar to this, is said to have been greatly valued by our surgeons as a detergent.

1018. *Volatile liniment.*

Take of oil of hartsorn, spirit of hartsorn, each equal parts. Mix them together.

Dr Pringle observes, that in the inflammatory quincy, or frangulation of the fauces, a piece of flannel, moistened with this mixture, and applied to the throat, to be renewed every four or five hours, is one of the most efficacious remedies. By means of this warm stimulating application, the neck, and sometimes the whole body, is put into a sweat; which, after bleeding, either carries off or lessens the inflammation.

1019. *White cerate.* L.

Take of oil olive, a quarter of a pint; white wax, four ounces; spermaceti, half an ounce. Liquefy them all together, and keep them stirring till the cerate is grown quite cold.

This differs from the white ointment and liniment only in being of a thicker consistence.

1020. *Yellow cerate.* L.

Take of yellow basilicum ointment, half a pound; yellow wax, one ounce. Melt them together.

This is no otherwise different from the yellow basilicum, than being of a stiffer consistence, which renders it for some purposes more commodious.

1021. *Eputotic cerate.* L.

Take of oil olive, one pint; yellow wax, calamine prepared, each half a pound. Liquefy the wax with the oil; and as soon as the mixture begins to grow stiff, sprinkle in the calamine; keeping them constantly stirring together, till the cerate is grown quite cold.

1022. *Ointment of calamine.* E.

Take of yellow wax, one pound; oil olive, two pints; calamine prepared, nine ounces. Melt the wax with the oil, and gradually sprinkle in the calamine, mixing and stirring them well together till grown cold.

These compositions are formed upon the cerate which Turner strongly recommends in cutaneous ulcerations and excoriations, and which has been usually distinguished by his name. They appear from experience to be excellent eputotics, and as such are frequently made use of in practice.

1023. *Palfey ointment.*

Take of hog's-lard, oil of bays, each four ounces; strong spirit of vitriol, one ounce. Mix, and make them into an unguent.

This irritating composition is applied to numbed or paralytic limbs: it soon reddens and inflames the skin, and when this effect is produced, must be taken off; after which, the part is to be anointed with any emollient unguent.

1024. *Liniment for the piles.*

Take of emollient ointment, two ounces; liquid laudanum, half an ounce. Mix these ingredients with the yolk of an egg, and work them well together.

1025. *Wax liniment.* E.

Take of oil olive, three ounces; spermaceti, three drams; white wax, two drams. Melt all together over a gentle fire; and keep the whole continually stirring till it cools.

SECT. XII. *Epithems.*1026. *Blistering epithem.* L.

Take of cantharides reduced into a most subtil powder, wheat flour, each equal weights. Make them into a paste with vinegar.

This composition is of a softer consistence than the blistering plasters, and for this reason is in some cases preferred. Practitioners differ with regard to the degree of consistence and adhesiveness most proper for applications of this kind, and sometimes vary them occasionally.

1027. *Cataplasn of cummin.* L.

Take of cummin seeds, half a pound; bay-berries, scordium-leaves dried, Virginian snakeroor, each three ounces; cloves, one ounce; honey, thrice the weight of the powdered species. Make them into a cataplasn.

This is a reformation of the *theriaca Londinensis*, which for some time past has been scarce otherwise made use of than as a warm cataplasn; only such of its ingredients are retained as contribute most to this intention.

1028. *Difcutient cataplasn.*

Take of bryony root, three ounces; elder flowers, one ounce; gum ammoniac, half an ounce; sal ammoniac, crude, two drams; camphorated spirit of wine, one ounce. Boil the roots and flowers in a sufficient quantity of water, till they become tender; and having then bruised them, add to them the gum ammoniac dissolved in a sufficient quantity vinegar, and likewise the sal ammoniac and spirit: mix the whole together, so as to make them into a cataplasn.

This composition is as good a difcutient as any thing that can well be contrived in the form of a cataplasn.

1029. *Ripening cataplasn.* L.

Take of figs, four ounces; yellow basilicum ointment, one ounce; galbanum, strained, half an ounce. Beat the figs thoroughly in a mortar, occasionally dropping in some spirit of wine or strong ale; then carefully mix with them the ointment, first liquefied along with the galbanum.

This composition is a good suppurant or ripener; though its effects probably depend more on its keeping the part soft, moist, and warm, than on any particular qualities of the ingredients.

1030. *A sinapism.* E.

Take of mustard-seed, in powder, crumb of bread, each equal parts; strong vinegar, as much as is sufficient.

Mix

Composi-
tions.

Mix and make them into a cataplasim; to which is sometimes added a little bruised garlic.

1031. *Compound sinapis.*

Take of mustard-seed in powder, crumb of bread, each two ounces; garlic, bruised, half an ounce; black soap, one ounce; strong vinegar, a sufficient quantity. Mix and make them into a cataplasim, according to art.

Both these compositions are employed only as stimulants: they often inflame the part, and raise blisters, but not so perfectly as cantharides. They are frequently applied to the soles of the feet in the low state of acute diseases, for raising the pulse and relieving the head.

1031. *Alum curd.*

Take any quantity of the white of eggs. Agitate it with a sufficiently large lump of alum, in a tin dish, until it is coagulated.

This preparation is taken from Riverius. It is an useful astringent epithem for sore, moist eyes; and excellently cools and represses thin dissections. Slighter inflammations of the eyes, occasioned by dust, exposure to the sun, or other like causes, are generally removed by fomenting them with warm milk and water, and washing them with the vitriolic water, n° 944. Where

the complaint is more violent, this preparation, after the inflammation has yielded a little to bleeding, is one of the best external remedies. It is to be spread on lint, and applied at bed-time.

1032. *Emollient cataplasim.*

Take of crumb of bread, eight ounces; white soap, one ounce; cows milk, fresh, a sufficient quantity. Boil them a little together.

1033. *Stomachic cataplasim.*

Take of the aromatic cataplasim, one ounce; expressed oil of mace, two drams; anodyne balsam, as much as is sufficient to reduce them into a proper consistence.

1034. *Camphorated cataplasim.*

Take of aromatic cataplasim, one ounce; camphor, one dram. Mix them together.

1035. *Ischiatic cataplasim.*

Take of mustard-seed, half a pound; white pepper, ginger, each one dram; simple oxymel, as much as will reduce them into a cataplasim.

The use of these compositions, which are taken from the hospitals, may be easily understood from their titles. The last is a very stimulating application, and frequently vesicates the skin.

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P H A

Pharos, PHAROS, (Homer, Strabo, &c.) a small oblong island, adjoining to the continent of Egypt, over-against Alexandria. On this island stood a cognominal light-tower, of four sides, each side a stadium in length; and the tower so high, as to be seen 100 miles off. Some affirm, each of its four corners rested on a large fear-bolt of glass or of hard transparent stone of Ethiopia or Memphis. Others imagine, the crabs were only added externally to the base by way of ornament, or as emblematical of its situation and use. The architect was Solstratus the Cnidian, as appears by an inscription on the tower, under Ptolemy Philadelphus, who laid out 800 talents upon it. On account of the port of Alexandria, the entrance to which was difficult and dangerous, the Pharos was called the *key of the Egyptian sea*, or even of Egypt itself, (Lucan): and Pharos, from being a proper name, is become an appellative, to denote all light-houses.

PHAROS, or *Phare*, a light-house; a pile raised near a port, where fire is kept burning in the night, to guide and direct vessels near at hand. The pharos of Alexandria, built in the island of Pharos, at the mouth of the Nile, was anciently very famous, inasmuch as to communicate its name to all the rest. This most magnificent tower consisted of several stories and galleries, with a lantern at top, in which a light being continually burning, might be seen for many leagues at sea, and along the coast.

PHARSALUS, PHARSALOS, *Pharsalia*, or *Pharsalum*, (anc. geog.) a town of the Phthiotis, a district of Thessaly, near Phæra and Larissa, to which last place Pompey fled from the plains of Pharsalus; watered by the river Enipeus, which falls into the Apidanus, and both together into the Peneus. Between Pharsalus and Enipeus, Pompey drew up his men at the fatal battle of Pharsalia.

In this battle, the advantage with respect to numbers was greatly on the side of Pompey. That general himself was on the left with the two legions which Cæsar had returned to him at the beginning of the war. Scipio, Pompey's father-in-law, was in the centre, with the legions he had brought from Syria, and the reinforcements sent by several kings and states of Asia. The Cilician legion, and some cohorts,

P H A

which had served in Spain, were in the right, under the command of Afranius. As Pompey's right wing was covered by the Enipeus, he strengthened the left with his slingers, archers, and the 7000 Roman horse, on whom chiefly his party founded their hopes of victory. The whole army was drawn up in three lines, with very little space between them. In conformity to this disposition, Cæsar's army was drawn up in the following order: The tenth legion, which had on all occasions signalized themselves above all the rest, was placed in the right wing, and the ninth in the left; but as the latter had been considerably weakened in the action at Dyrrhachium, the eighth legion was posted so near it, as to be able to support and reinforce it upon occasion. The rest of Cæsar's forces filled up the space between the two wings. Marc Antony commanded the left wing, Sylla the right, and Cneius Domitius Calvinus the main body. As for Cæsar, he posted himself on the right over-against Pompey, that he might have him always in his sight.

This was the whole plain covered, from Pharsalia to the Enipeus, with two armies, dressed and armed after the same manner, and bearing the same ensigns, the Roman eagles. Pompey observing how well the enemy kept their ranks, expecting quietly the signal of battle, and on the contrary how impatient and unsteady his own men were, running up and down in great disorder for want of experience, he began to be afraid lest his ranks should be broken upon the first onset; and therefore commanded the foot in the front to keep their ground, and quietly wait for the enemy. The two armies, though within reach of each other, kept a mournful silence; but at length the trumpets sounded the charge, and Cæsar's army advanced in good order to begin the attack, being encouraged by the example of one Caius Crassinus, a centurion, who at the head of 120 men threw himself upon the enemy's first line with incredible fury. This he did to acquit himself of a promise he had solemnly made to Cæsar, who, meeting him as he was going out of his tent in the morning, asked him, after some discourse, *What his opinion was touching the event of the battle?* To which he, stretching out his hand, replied aloud, *Thine is the victory, Cæsar; thou shalt gloriously conquer,*

Pharsalus.

quor,

Pharalus. *guer, and I myself this day will be the subject of thy praise either dead or alive.* In pursuance of this promise, he broke out of his rank, as soon as the trumpets sounded; and, at the head of his company, ran in upon the enemy, and made a great slaughter of them. But while he was still pressing forward, forcing his way through the first line, one of Pompey's men ran him in at the mouth with such violence, that the point of his sword came out at the hind-part of his neck. Upon his death, Pompey's soldiers took courage, and with great bravery flood the enemy's onset. While the foot were thus sharply engaged in the centre, Pompey's horse in the left wing marched up confidently; and having first widened their ranks, with a design to surround Cæsar's right wing, charged his cavalry, and forced them to give ground. Hereupon Cæsar ordered his horse to retreat a little, and give way to the six cohorts, which he had posted in the rear as a body of reserve. These, upon a signal given, coming up, charged the enemy's horse with that resolution and good order which is peculiar to men who have spent all their lives in camps. They remembered their instructions, not striking at the legs or thighs of the enemy, but aiming only at their faces. This unexpected and new manner of fighting had the desired effect. For the young patricians, whom Cæsar contemptuously calls the *pretty young dancers*, not being able to bear the thoughts of having their faces deformed with scars, turned their backs, and, covering their faces with their hands, fled in the utmost confusion, leaving the foot at the mercy of the enemy. Cæsar's men did not pursue the fugitives; but charging the foot of that wing, now naked and unguarded, surrounded them, and cut most of them in pieces.

Pompey was so transported with rage, in seeing the flower of his forces thus put to flight or cut in pieces, that he left his army, and retired slowly towards his camp, looking more like a man distracted and beside himself, than one who by his exploits had acquired the name of *the Great*. When he had reached the camp, he retired to his tent, without speaking a word to any; and continued there, like one distracted and out of his senses, till his whole army was defeated. Cæsar no sooner saw himself master of the field, than he marched to attack the enemy's entrenchments, that Pompey might not have time to recollect himself. When Pompey was informed that his rival was advancing to attack his entrenchments, he then first seemed to have recovered his senses, and cried out, *What, into my camp too?* He said no more; but immediately laying aside the marks of his dignity, and putting on such a garment as might best favour his flight, he stole out at the decuman gate, and took the road to Larissa, which city had hitherto shewn great attachment to him. In the mean time, Cæsar began the attack on the enemy's camp, which was vigorously defended by the cohorts Pompey had left to guard it; but they were at length forced to yield. Cæsar was not a little surprised, when, after having forced the entrenchments, he found the enemy's tents and pavilions richly adorned with carpets and hangings, their couches strewed with flowers, their tables ready spread, and side-boards set out with abundance of plate, bowls, and glasses, and some of them even filled with wine.

So great was the confidence of Pompey's party, that they made preparations before-hand for pleasures to be enjoyed after the victory, which they thought certain. In Pompey's tent, Cæsar found the box in which he kept his letters; but, with a moderation and magnanimity worthy of himself, he burnt them all, without reading one; saying, that he had rather be ignorant of crimes, than obliged to punish them.

The next day, when the dead were numbered, it appeared that Cæsar had scarce lost 200 men; among whom was about 30 centurions, whom Cæsar caused to be buried with great solemnity. He did particular honours to the body of Crastinus, who had begun the battle; and ordered his ashes to be deposited in a tomb, which he erected to his memory. On Pompey's side, the number of the dead amounted to 15,000 according to some, and to 25,000 according to others. Cæsar took 24,000 prisoners, eight eagles, and 180 ensigns.

PHARYNX, in anatomy. See there, n° 353.

PHASEOLUS, the KIDNEY-BEAN; a genus of the decandria order, belonging to the diadelphia class of plants. There is only one species; but of this there are many varieties. Those principally cultivated for the table are, 1. The common white, or Dutch kidney-bean. 2. The smaller kidney-bean, commonly called the *Battersea kidney-bean*. And, 3. The upright sort, called the *tree kidney-bean*.

1. The first sort was some time ago propagated in England, and is still in Holland: it grows very tall, and requires long stakes and poles to climb on, and its beans are considerably broad: this makes them less saleable in the markets, people supposing them to be old because they are broad; and they are hence grown into disuse, though a much more valuable kind for eating than any other.

2. The second sort, or Battersea bean, is what is more universally cultivated: it never grows very tall, nor rambles far, and the air can easily pass between the rows, because of its moderate growth; and this makes it bear plentifully, and ripen well for the table. It is the best-tasted bean, except the last.

3. The third, or tree kidney-bean, is also a plentiful bearer, and never rambles, but grows up in form of a shrub; but its beans are broader than the Battersea kind, and are not so well tasted.

They are all propagated from seeds, which are to be put into the ground in the latter end of March or beginning of April for an early crop; but these should have a warm situation and a dry soil; they must also be planted in a dry season. The manner of planting them is, to draw lines with a bough over the bed, at two feet and a half distance, into which the seeds are to be dropped at about two inches asunder; and the earth is to be drawn over them with the head of a rake, to cover them about an inch deep. In a week after sowing, the plants will appear, and the earth should be drawn up about their stalks as they rise up; for a few days after this they will require no further care, except to be kept clear from weeds, and, when the beans appear, to have them gathered twice a-week; for if the beans are suffered to hang on too long, they not only become of no value, but they weaken the plant. The first crop of kidney-beans will continue a month in good order; and to supply the table afterwards,

Pharynx,
Phaseolus.

Phases,
Phasianus.

wards, there should be fresh sowings in March, April, May, and June, the last of which will continue till the frosts come to destroy them. Some raise their early crops on hot-beds; and this is to be done exactly in the same manner as the raising the early cucumbers.

PHASES, in astronomy, from the Greek word *φαειναι*, "to appear;" the several appearances or quantities of illumination of the moon, Venus, Mercury, and the other planets. See ASTRONOMY.

PHASIANUS, in ornithology, a genus belonging to the order of gallinæ. The cheeks are covered with a smooth naked skin. There are six species, viz.

Dung-hill
Cock.

1. The gallus, or common dung-hill cock and hen, with a compressed caruncle or fleshy comb on the top of the head, and a couple of caruncles or wattles under the chin. The ears are naked, and the tail is compressed and erected. Of all other birds, perhaps this species affords the greatest number of varieties; there being scarce two to be found that exactly resemble each other in plumage and form. The tail, which makes such a beautiful figure in the generality of these birds, is yet found entirely wanting in others; and not only the tail, but the rump also. The toes, which are usually four in all animals of the poultry kind, yet in a species of the cock are found to amount to five. The feathers, which lie so sleek and in such beautiful order in most of those we are acquainted with, are in a peculiar breed all inverted, and stand staring the wrong way. Nay, there is a species that comes from Japan, which instead of feathers seems to be covered over with hair.

It is not well ascertained when the cock was first made domestic in Europe; but it is generally agreed that we first had him in our western world from the kingdom of Persia. Aristophanes calls the cock the *Persian bird*; and tells us he enjoyed that kingdom before some of its earliest monarchs. This animal was in fact known so early even in the most savage parts of Europe, that we are told the cock was one of the forbidden foods among the ancient Britons. Indeed, the domestic fowl seems to have banished the wild one. Persia itself, that first introduced it to our acquaintance, seems no longer to know it in its natural form; and if we did not find it wild in some of the woods of India, as well as those of the islands in the Indian ocean, we might begin to doubt, as we do with regard to the sheep, in what form it first existed in a state of nature. But the cock is still found in the islands of Tinian, in many others of the Indian ocean, and in the woods on the coast of Malabar, in his ancient state of independence. In his wild condition, his plumage is black and yellow, and his comb and wattles yellow and purple. There is another peculiarity also in those of the Indian woods; their bones, which, when boiled, with us are white, as every body knows, in those are as black as ebony.

In their first propagation in Europe, there were distinctions then that now subsist no longer. The ancients esteemed those fowls whose plumage was reddish as invaluable; but as for the white, it was considered as utterly unfit for domestic purposes. These they regarded as subject to become a prey to rapacious birds; and Aristotle thinks them less fruitful than the former. Indeed, his division of those birds seems taken from

their culinary uses: the one sort he calls *generous and noble*, being remarkable for fecundity; the other sort, *ignoble and useless*, from their sterility. These distinctions differ widely from our modern notions of generosity in this animal; that which we call the *game-cock* being by no means so fruitful as the ungenerous dung-hill cock, which we treat with contempt. The Athenians had their cock-matches as well as we; but it is probable they did not enter into our refinement of choosing out the most barren of the species for the purpose of combat.

However this be, no animal in the world has greater courage than the cock when opposed to one of his own species; and in every part of the world where refinement and polished manners have not entirely taken place, cock-fighting is a principal diversion. In China, India, the Philippine islands, and all over the East, cock-fighting is the sport and amusement even of kings and princes. With us it is declining every day; and it is to be hoped it will in time become only the pastime of the lowest vulgar. See the article *Cock-fighting*.

The cock claps his wings before he sings or crows. His sight is very piercing; and he never fails to cry in a peculiar manner, when he discovers any bird of prey in the air. His extraordinary courage is thought to proceed from his being the most salacious of all other birds whatsoever. A single cock suffices for ten or a dozen hens; and it is said of him that he is the only animal whose spirits are not abated by indulgence. But then he soon grows old; the radical moisture is exhausted; and in three or four years he becomes utterly unfit for the purposes of impregnation. "Hens also, (to use the words of Willoughby), as they for the greatest part of the year daily lay eggs, cannot suffice for so many births, but for the most part after three years become effete and barren: for when they have exhausted all their feed-eggs, of which they had but a certain quantity from the beginning, they must necessarily cease to lay, there being no new ones generated within."

Domestic
Hen.

The hen seldom clutches a brood of chickens above once a season, though instances have been known in which they produced two. The number of eggs a domestic hen will lay in the year are above 200, provided she be well fed and supplied with water and liberty. It matters not much whether she be trodden by the cock or no; she will continue to lay, although the eggs of this kind can never by hatching be brought to produce a living animal. Her nest is made without any care, if left to herself; a hole scratched into the ground, among a few bushes, is the only preparation she makes for this season of patient expectation. Nature, almost exalted by its own fecundity, seems to inform her of the proper time for hatching, which she herself testifies by a clucking note, and by discontinuing to lay. The good housewives, who often get more by their hens laying than by their chickens, often artificially protract this clucking season, and sometimes entirely remove it. As soon as a hen begins to cluck, they stint her in her provisions; which, if that fails, they plunge her into cold water; this, for the time, effectually puts back her hatching; but then it often kills the poor bird, who takes cold and dies under the operation.

If left entirely to herself, the hen would seldom lay above 20 eggs in the same nest, without attempting to hatch



THASIANUS GALLUS
communis Cocks & Hen.



Pavo cristatus
or Peacock.



Hen.





Phasianus. hatch them: but in proportion as she lays, her eggs are removed; and she continues to lay, vainly hoping to increase the number. In the wild state, the hen seldom lays above 15 eggs; but then her provision is more difficultly obtained, and she is perhaps sensible of the difficulty of maintaining too numerous a family.

When the hen begins to sit, nothing can exceed her performance and patience: she continues for some days immovable; and when forced away by the importunities of hunger, she quickly returns. Sometimes also her eggs become too hot for her to bear, especially if she be furnished with too warm a nest within doors, for then she is obliged to leave them to cool a little: thus the warmth of the nest only retards incubation, and often puts the brood a day or two back in the shell. While the hen sits, she carefully turns her eggs, and even removes them to different situations; till at length, in about three weeks, the young brood begin to give signs of a desire to burst their confinement. When by the repeated efforts of their bill, which serves like a pioneer on this occasion, they have broke themselves a passage through the shell, the hen still continues to sit till all are excluded. The strongest and best chickens generally are the first candidates for liberty; the weakest come behind, and some even die in the shell. When all are produced, she then leads them forth to provide for themselves. Her affection and her pride seem then to alter her very nature, and correct her imperfections. No longer voracious or cowardly, she abstains from all food that her young can swallow, and flies boldly at every creature that she thinks is likely to do them mischief. Whatever the invading animal be, she boldly attacks him; the horse, the hog, or the mastiff. When marching at the head of her little troop, she acts the commander; and has a variety of notes to call her numerous train to their food, or to warn them of approaching danger. Upon one of these occasions, the whole brood have been seen to run for security into the thickest part of an hedge, while the hen herself ventured boldly forth, and faced a fox that came for plunder.

Ten or twelve chickens are the greatest number that a good hen can rear and clutch at a time; but as this bears no proportion to the number of her eggs, schemes have been imagined to clutch all the eggs of an hen, and thus turn her produce to the greatest advantage. By these contrivances it has been obtained, that a hen that ordinarily produces but 12 chickens in the year, is found to produce as many chickens as eggs, and consequently often above 200. This contrivance is the artificial method of HATCHING chickens in stoves, as is practised at Grand Cairo; or in a chemical laboratory properly graduated, as has been effected by Mr Reaumur. At Grand Cairo, they thus produce 6000 or 7000 chickens at a time; where, as they are brought forth in their mild spring, which is warmer than our summer, the young ones thrive without clutching. But it is otherwise in our colder and unequal climate; the little animal may without much difficulty be hatched from the shell, but they almost all perish when excluded. To remedy this, Reaumur has made use of a woollen hen, as he calls it; which was nothing more than putting the young ones in a warm basket, and clapping over them a thick woollen canopy.

Capons may very easily be taught to clutch a fresh

brood of chickens throughout the year; so that when one little colony is thus reared, another may be brought to succeed it. Nothing is more common than to see capons thus employed; and the manner of teaching them is this: First the capon is made very tame, so as to feed from one's hand; then, about evening, they pluck the feathers off his breast, and rub the bare skin with nettles; they then put the chickens to him; which presently run under his breast and belly, and probably rubbing his bare skin gently with their heads, allay the stinging pain which the nettles had just produced. This is repeated for two or three nights, till the animal takes an affection to the chickens that have thus given him relief, and continues to give them the protection they seek for: perhaps also the querulous voice of the chickens may be pleasant to him in misery, and invite him to succour the distressed. He from that time brings up a brood of chickens like a hen, clutching them, feeding them, clucking, and performing all the functions of the tenderest parent. A capon once accustomed to this service, will not give over; but when one brood is grown up, he may have another nearly hatched put under him, which he will treat with the same tenderness he did the former.

The cock, from his falaciousness, is allowed to be a short-lived animal; but how long these birds live, if left to themselves, is not yet well ascertained by any historian. As they are kept only for profit, and in a few years become unfit for generation, there are few that, from mere motives of curiosity, will make the tedious experiment of maintaining a proper number till they die. Aldrovandus hints their age to be 10 years; and it is probable that this may be its extent. They are subject to some disorders; and as for poisons, besides nux vomica, which is fatal to most animals except man, they are injured, as Linnaeus asserts, by elderberries; of which they are not a little fond.

2. The motmot, or Guinea pheasant, is brownish, *Phasians.* somewhat red below, with a wedge-like tail, and wants spurs.

3. The colchicus is red, with a blue head, a wedge-shaped tail, and papillous cheeks. It is a native of Africa and Asia. 4. The argus is yellowish, with black spots, a red face, and a blue crest on the back part of the head. It is found in Chinese Tartary. 5. The pictus has a yellow crest, a red breast, and a wedge-shaped tail. It is a native of China. 6. The nealiemerus is white, with a black crest and belly, and a wedge-shaped tail. It is a native of China.

Pheasants were originally brought into Europe from the banks of the Phasis, a river of Colchis, in Asia Minor; and from whence they still retain their name. Next to the peacock, they are the most beautiful of birds, as well for the vivid colour of their plumes as for their happy mixtures and variety. It is far beyond the power of the pencil to draw any thing so glossy, so bright, or points so finely blending into each other. We are told, that when Cræsus, king of Lydia, was seated on his throne, adorned with royal magnificence and all the barbarous pomp of eastern splendour, he asked Solon if he had ever beheld any thing so fine? The Greek philosopher, no way moved by the objects before him, or taking a pride in his native simplicity, replied, That after having seen the beautiful plumage of the pheasant, he could be astonished at no other finery.

Pheasants.

These birds, tho' so beautiful to the eye, are not less delicate when served up to the table. Their flesh is considered as the greatest dainty; and when the old physicians spoke of the wholesomeness of any viands, they made their comparison with the flesh of the pheasant. However, notwithstanding all these perfections to tempt the curiosity or the palate, the pheasant has multiplied in its wild state.

A spirit of independence seems to attend the pheasant even in captivity. In the woods, the hen-pheasant lays from 18 to 20 eggs in a season; but in a domestic state, she seldom lays above 10. In the same manner, when wild, she hatches and leads up her brood with patience, vigilance, and courage; but when kept tame, she never fits well, so that a hen is generally her substitute upon such occasions: and as for leading her young to their food, she is utterly ignorant of where it is to be found; and the young birds starve, if left solely to her protection. The pheasant, therefore, on every account, seems better left at large in the woods than reclaimed to pristine captivity. Its fecundity when wild is sufficient to stock the forest; its beautiful plumage adorns it; and its flesh retains a higher flavour from its unlimited freedom.

However, it has been the aim of late to take these birds once more from the woods, and to keep them in places fitted for their reception. Like all others of the poultry kind, they have no great sagacity, and suffer themselves easily to be taken. At night they roost upon the highest trees of the wood; and by day they come down into the lower brakes and bushes, where their food is chiefly found. They generally make a kind of flapping noise when they are with the females; and this often apprises the sportsman of their retreats. At other times he tracks them in the snow, and frequently takes them in springs. But of all birds they are shot most easily; as they always make a whirring noise when they rise, by which they alarm the gunner, and being a large mark, and flying very slow, there is scarce any missing them.

When these birds are taken young into keeping, they become as familiar as chickens: and when they are designed for breeding, they are put together in a yard, five hens to a cock; for this bird, like all of the poultry kind, is very falacious. In her natural state the female makes her nest of dry grass and leaves; the same must be laid for her in the pheasantry, and she herself will sometimes properly dispose them. If she refuses to hatch her eggs, then a common hen must be got to supply her place, which task she will perform with perseverance and success. The young ones are very difficult to be reared; and they must be supplied with anti-eggs, which is the food the old one leads them to gather when wild in the woods. To make these go the farther, they are to be chopped up with curds or other meat; and the young ones are to be fed with great exactness, both as to the quantity and the time of their supply. This food is sometimes also to be varied; and wood-lice, ear-wigs, and other insects, are to make a variety. The place where they are reared must be kept extremely clean; their water must be changed twice or thrice a-day; they must not be exposed till the dew is off the ground in the morning, and they should always be taken in before sun-set. When they become adult, they very well can shift for

themselves, but they are particularly fond of oats and Phasians Phial.

In order to increase the breed, and make it still more valuable, Longolius teaches us a method that appears very peculiar. The pheasant is a very bold bird when first brought into the yard among other poultry, not sparing the peacock, nor even such young cocks and hens as it can master; but after a time it will live tamely among them, and will at last be brought to couple with a common hen. The breed thus produced take much stronger after the pheasant than the hen; and in a few successions, if they be let to breed with the cock-pheasant, for the mixture is not barren, there will be produced a species more tame, stronger, and more prolific; so that he adds, that it is strange why most of our pheasandries are not stocked with birds produced in this manner.

The pheasant, when full grown, seems to feed indifferently upon every thing that offers. It is said by a French writer, that one of the king's sportsmen shooting at a parcel of crows that were gathered round a dead carcase, to his great surprise upon coming up, found that he had killed as many pheasants as crows. It is even asserted by some, that such is the carnivorous disposition of this bird, that when several of them are put together in the same yard, if one of them happens to fall sick, or seems to be pining, that all the rest will fall upon, kill, and devour it. Such is the language of books; those who have frequent opportunities of examining the manners of the bird itself, know what credit ought to be given to such an account.

PHASMATA, in physiology, certain appearances arising from the various tinctures of the clouds by the rays of the heavenly bodies, especially the sun and moon. These are infinitely diversified by the different figures and situations of the clouds, and the appulses of the rays of light.

PHASSACHATES, in natural history, the name of a species of agate, which the ancients, in its various appearances, sometimes called *leucachates* and *perileucor*.

PHEASANT, in ornithology. See PHASIANUS.

PHELLANDRIUM, WATER-HEMLOCK, a genus of the digynia order, belonging to the pentandria class of plants. There are two species; one of which, viz. the aquaticum, is a native of Britain. This grows in ditches and ponds, but is not very common. The stalk is remarkably thick and dichotomous, and grows in the water. It is a poison to horses, bringing upon them, as Linnaeus informs us, a kind of palsy; which, however, he supposes to be owing not so much to the noxious qualities of the plant itself, as to those of an insect which feeds upon it, breeding within the stalks, and which he calls *curculio paraplecticus*. The Swedes give swine's dung for the cure. The seeds are sometimes given in intermittent fevers, and the leaves are by some added to discutient cataplasms. In the winter, the roots and stem, diffused by the influence of the weather, afford a very curious skeleton or network. Horses, sheep, and goats, eat the plant; swine are not fond of it; cows refuse it.

PHENICIA. See PHOENICIA.

PHEONS, in heraldry, the barbed heads of darts, arrows, or other weapons.

PHIAL, a well-known vessel made of glass, used for

Phidias for various purposes.

Leyden PHIAL; a phial of glass coated on both sides with tin-foil for a considerable way up the sides, of great use in electrical experiments. See *ELECTRICITY*, *passim*.

PHIDIAS, the most famous sculptor of antiquity, was an Athenian, and a contemporary of the celebrated Pericles, who flourished in the 83d Olympiad. This wonderful artist was not only consummate in the use of his tools, but accomplished in those sciences and branches of knowledge which belong to his profession, as history, poetry, fable, geometry, optics, &c. He first taught the Greeks to imitate nature perfectly in this way; and all his works were received with admiration. They were also incredibly numerous; for it was almost peculiar to Phidias, that he united the greatest facility with the greatest perfection. His Nemesis was ranked among his first pieces: it was carved out of a block of marble, which was found in the camp of the Persians after they were defeated in the plains of Marathon. He made an excellent statue of Minerva for the Plateaus; but the statue of this goddess in her magnificent temple at Athens, of which there are still some ruined remains, was an astonishing production of human art. Pericles, who had the care of this pompous edifice, gave orders to Phidias, whose prodigious talents he well knew, to make a statue of the goddess; and Phidias formed a figure of ivory and gold 39 feet high. Writers never speak of this illustrious monument of skill without raptures; yet what has rendered the name of the artist immortal, proved at that time his ruin. He had carved upon the shield of the goddess his own portrait, and that of Pericles; and this, by those that envied them, made a crime in Phidias. He was also charged with embezzling part of the materials which were designed for the statue. Upon this he withdrew to Elis, and revenged himself upon the ungrateful Athenians, by making for the Elians the Olympic Jupiter: a prodigy of art, and which was afterwards ranked among the seven wonders of the world. It was of ivory and gold; 60 feet high, and every way proportioned. "The majesty of the work did equal the majesty of the god," says Quintilian, "and its beauty seems to have added 'lustre to the religion of the country.'" Phidias concluded his labours with this master-piece; and the Elians, to do honour to his memory, erected, and appropriated to his descendants, an office, which consisted in keeping clean this magnificent image.

PHIDITIA, in Grecian antiquity, feasts celebrated with great frugality at Sparta. They were held in the public places and in the open air. Rich and poor assisted at them equally, and on the same footing; their design being to keep up peace, friendship, good understanding and equality among the citizens great and small. It is said that those who attended this feast brought each a bushel of flour, eight measures of wine named *chorus*, five mince of cheese, and as many figs.

PHILADELPHIA, the capital of the province of Pennsylvania in North America, situated in W. Lon. 75. o. N. Lat. 40. 30. It is one of the most beautiful and regular cities in the world, being an oblong of two miles, extending from the river Delaware to the Schuylkill, with the east end fronting the river

Delaware, the west the river Schuylkill, and each front a mile in length. The river Delaware is navigable from the sea for large vessels above 200 miles, and that of Schuylkill as far as Philadelphia. Every man in possession of 1000 acres has his house either in one of the fronts facing the rivers, or in the high-street, running from the middle of one front to the middle of the other. Every owner of 5000 acres, besides the above-mentioned privilege, is intitled to have an acre of ground in the front of his house, and all others may have half an acre, for gardens and court-yards. Every quarter of the city forms a square of eight acres; and almost in the centre of it is a square of ten acres, surrounded by the town-house and other public buildings. The high-street is 100 feet wide, and runs the whole length of the town: parallel to it run eight other streets, which are crossed by 20 more at right angles, all of them 30 feet wide, and communicating with canals from the two rivers, which add not only to the beauty, but the wholesomeness of the city. Ships of 400 or 500 tons may come up to the key, which is 200 feet square, and furnished with all the conveniences for ship-building, as well as for loading and unloading goods. Though the whole of this magnificent plan hath not yet been carried into execution, a considerable progress hath been made towards it. The town-house is so stately, spacious, and regular, that it would make a figure in any capital of Europe. The other public buildings are, the court-house, two Quakers meeting-houses, one church of England, one Baptist meeting, one Dutch Lutheran church, one Dutch Calvinist church, one Moravian church, one mals-house, the Quakers school house, the city alms-house, the Quakers alms-house, the hospital, prison, and work-house.

PHILADELPHIA, an ancient town of Turkey in Asia, in Natolia; seated at the foot of mount Tmolus, from whence there is a fine view over an extensive plain. The Greeks retain its ancient name, but by the Turks it is called *Allahijur*. It contains 7 or 8000 inhabitants; of whom 2000 are Christians, who have four churches, over which presides an archbishop. E. Lon. 28. 25. N. Lat. 38. 45.

PHILADELPHUS, the PIPE-TREE, or *Mock-orange*; a genus of the monogynia order belonging to the icofandria class of plants.

Species 1. The coronarius, white syringo, or mock-orange, has been long cultivated in the gardens of this country as a flowering shrub; it is not well known in what country it is to be found native. It rises seven or eight feet high; sending up a great number of slender stalks from the root. These have a gray bark, branch out from their sides, and are garnished with oval spear-shaped leaves. These last have deep indentures on their edges; their upper surface being of a deep green, but the under surface pale, with the taste of a fresh cucumber. The flowers are white, and come out from the sides and at the ends of the branches in loose bunches, each standing on a distinct foot-stalk: they have four oval petals, which spread open, with a great number of stamina within, surrounding the style. Their smell at some distance resembles that of orange-flowers, but is too powerful for most people when near. 2. The nanus, with oval leaves somewhat indented and double flowers, seldom

Philadel-
phia,
Philadel-
phus.

Philippi. rises above three feet high; the flowers come out singly from the sides of the branches, and have a double or treble row of petals of the same size and form as well as the same scent with the former; but this sort flowers very rarely, so is but little esteemed. 3. The inodorus with entire leaves, is a native of Carolina, and as yet but little known in Europe. It rises with a shrubby stalk of about 16 feet in height, sending out slender branches from the sides opposite, garnished with smooth leaves sharpened like those of the pear-tree, and standing on pretty long foot-stalks. The flowers are produced at the ends of the branches; and are large, white, spreading open, with a great number of short stamina with yellow summits.

Culture. The first two species are extremely hardy, but grow taller in light good ground than in such as is stiff. They are usually propagated by suckers, which are produced by the roots in great plenty. The last species cannot be propagated in this country by seeds, which is the reason of its scarcity; however, it may be produced by laying down the branches. It is also liable to be destroyed by cold in severe winters, and therefore ought to be sheltered during that season.

PHILIPPI (anc. geog.), a town of Macedonia, in the territory of the Edones, on the confines of Thrace (Pliny, Ptolemy), situate on the side of a steep eminence; anciently called *Datum* and *Drenides* (African), though Strabo seems to distinguish them. This town was famous on several accounts; not only as taking its name from the celebrated Philip of Macedon, father to Alexander the Great, who considered it as a fit place for carrying on the war against the Thracians; but also on account of two battles fought in its neighbourhood between Augustus and the republican party. In the first of these battles, Brutus and Cassius had the command of the republican army; while Octavianus, afterwards Augustus, and Mark Anthony, had the command of their adversaries. The army of Brutus and Cassius consisted of 19 legions and 20,000 horse; the imperial forces of an equal number of legions, but more complete, and 13,000 horse; so that the numbers on both sides were pretty equal. The troops of Brutus were very richly dressed; most of them having their armour adorned with gold and silver; for Brutus, though very frugal in other respects, was thus extravagant with respect to his men, thinking that the riches that they had about them would make them exert themselves the more, to prevent these from falling into the enemy's hands. Both the republican generals appear to have been inferior in skill to Mark Anthony; for as to Octavianus, he is allowed never to have conquered but by the valour of others. A little before the first engagement, Octavianus, who had been indisposed, was carried out of the camp, at the persuasion of Artorius his physician, who had dreamed that he saw a vision directing him to be removed. Brutus's men, who opposed the wing commanded by Octavianus, charged without orders, which caused great confusion. However, they were successful: for part of them, taking a compass about, fell upon the enemy's rear; after which they took and plundered the camp; making a great slaughter of such as were in it, and, among the rest putting 2000 Lacedæmonians to the sword who were newly come to

the assistance of Octavianus. The emperor himself was fought for, but in vain, he having been conveyed away for the reason abovementioned; and as the soldiers pierced the litter in which he was usually carried, it was thence reported that he had been killed. This threw that whole part of the army into such consternation, that when Brutus attacked them in front, they were most completely routed; three whole legions being cut in pieces, and a prodigious slaughter made among the fugitives. But by the imprudence of the general in pursuing too far, the wing of the republican army commanded by Cassius was left naked and separated from the rest of the army; on which they were attacked at once in front and in flank, and thus they were defeated and their camp taken, while Brutus imagined that he had gained a complete victory. Cassius himself retired to an eminence at a small distance from Philippi; whence he sent one of his greatest intimates to procure intelligence concerning the fate of Brutus. That general was on his way, and already in view, when the messenger set out. He soon met his friends; but they surrounding him to inquire the news, Cassius, who beheld what passed, imagined that he was taken prisoner by the enemy, retired to his tent, and in despair caused one of his freedmen to cut off his head. Thus far at least is certain, that he went into the tent with that freedman, and that his head was found separated from his body when Brutus entered. However, the freedman was never afterwards seen.

The second engagement was pretty similar to the first. Brutus again opposed Octavianus, and met with the same success; but in the mean time Anthony, to whom he ought undoubtedly to have opposed himself, having to do only with the lieutenants of Cassius, gained a complete victory over them. What was worst, the fugitives, instead of leaving the field of battle altogether, fled for protection to Brutus's army; where, crowding in among the ranks, they carried despair and confusion wherever they went, so that a total defeat ensued, and the republican army was almost entirely cut in pieces. After the battle, Brutus put an end to his own life, as is related more fully under the article *ROME*.

The city of Philippi is likewise remarkable on account of an epistle written by St Paul to the church in that place. It was a Roman colony, (Luke, Pliny, coin, inscription). It is also remarkable for being the birth-place of Adrastus, the peripatetic philosopher, and disciple of Aristotle.—The town is still in being, and is an archbishop's see; but greatly decayed and badly peopled. However, there is an old amphitheatre, and several other monuments of its ancient grandeur. E. Long. 44. 55. N. Lat. 41. 0.

PHILIPPINE ISLANDS, certain islands of Asia, lying between 114 and 131 degrees of east longitude, and between 5 and 19 of north latitude, about 300 miles south-east of China. The chief of them are those of Luconia or Manila, Tandaga or Samar, Mofate, Mindora, Luban, Paragoa, Panay, Leyte, Bohol, Sibiu, Sogbu, Negros, St John, Xollo, and Mindanao. They were discovered by Ferdinand Magellan, a Portuguese gentleman, who had served his native country both in the wars of Africa and in the East Indies; particularly under Albuquerque, the famous Portuguese general, who reduced Goa and Malacca to the

the obedience of that crown. Magellan, having had a considerable share in those actions, and finding himself neglected by the government of Portugal, and even denied, as it is said, the small advance of a ducat a month in his pay, left the court of Portugal in disgust, and offered his service to Charles V. then emperor of Germany and king of Spain, whom he convinced of the probability of discovering a way to the Spice Islands, in the East Indies, by the west; whereupon, the command of five small ships being given him, he set sail from Seville, on the tenth of August 1519, and standing over to the coast of South America, proceeded southward to 52°, where he fortunately hit upon a strait, since called the *Strait of Magellan*, which carried him into the Pacific Ocean or South Sea; and then, steering northward, repassed the equator; after which, he stretched away to the west, across that vast ocean, till he arrived at Guam, one of the Ladrões, on the sixth of March 1521; and soon after got to the Philippine Islands, which he took possession of in the name of the king of Spain, but happened to be killed in a skirmish he had with the natives of one of them. His people, however, arrived afterwards at the Moluccas, or Clove Islands, where they left a colony, and returned to Spain, by the way of the Cape of Good Hope; being the first that ever sailed round the globe. But there was no attempt made by the Spaniards to subdue or plant the Philippine Islands until the year 1564, in the reign of Philip II. son of Charles V. when Don Lewis de Velasco, viceroy of Mexico, sent Michael Lopez Delagafes thither with a fleet, and a force sufficient to make a conquest of these islands, which he named the *Philippines*, in honour of Philip II. then upon the throne of Spain; and they have ever since been subject to that crown.

The inhabitants of these islands consist of Chinese, Ethiopians, Malays, Spaniards, Portuguese, Pintados or Painted People, and Mestices, a mixture of all these. Their persons and habits resemble those of the several nations whence they derive their original; only, it is observable, that the features of the blacks of these islands are as agreeable as those of the white people. There is not a soil in the world that produces greater plenty of all things for life; as appears by the multitude of inhabitants to be found in the woods and mountains, who subsist almost entirely by the fruits of the earth, and the venison they take. Nor can any country appear more beautiful; for there is a perpetual verdure, and buds, blossoms, and fruit, are found upon the trees all the year round, as well on the mountains as in the cultivated gardens. Vast quantities of gold are washed down from the hills by the rains, and found mixed with the sand of their rivers. There are also mines of other metals, and excellent load-stones found here; and such numbers of wild buffaloes, that a good huntsman on horseback, armed with a spear, will kill 10 or 20 in a day. The Spaniards take them for their hides, which they sell to the Chinese; and their carcases serve the mountaineers for food. Their woods also abound with deer, wild hogs, and goats. Of the last, there is such plenty in one of these islands, that the Spaniards gave it the name of *Cabras*. Horses and cows have been likewise imported into these islands, from New Spain, China,

and Japan, which have multiplied considerably; but the sheep that were brought over came to nothing. The trees produce a great variety of gums; one kind, which is the commonest, by the Spaniards called *brea*, is used instead of pitch; of the others, some are medicinal, others odoriferous.

In those islands are monkeys and baboons of a monstrous bigness, that will defend themselves if attacked by men. When they can find no fruit in the mountains, they go down to the sea to catch crabs and oysters; and that the oysters may not close and catch their paws, they first put in a stone to prevent their shutting close: they take crabs by putting their tail in the holes where they lie, and when the crab lays hold of it, they draw him out. There are also great numbers of civet-cats in some of the islands. The bird called *tavan*, is a black sea-fowl, something less than a hen, and has a long neck; it lays its eggs in the sand by the sea-side, 40 or 50 in a trench, and then covers them, and they are hatched by the heat of the sun. They have likewise the bird *saligan*, which builds her nest on the sides of rocks, as the swallows do against a wall; and these are the delicious *Birds-Nests*, so much esteemed, being a kind of jelly that dissolves in warm water.

The Spaniards have introduced several of the American fruits, which thrive here as well as in America; the cocoa or chocolate-nut particularly, which increases so that they have no occasion now to import it from Mexico. Here is also the *Fountain-Tree*, from which the natives draw water; and there is likewise a kind of cane, by the Spaniards called *vaxuco*, which, if cut, yields fair water enough for a draught, of which there are plenty in the mountains, where water is most wanted.

These islands being hot and moist, produce abundance of venomous creatures, as the soil does poisonous herbs and flowers, which do not kill those who touch or taste them, but so infect the air, that many people die in the time of their blossoming.

The orange, lemon, and several other trees, bear twice a year. If they plant a sprig, within a year it becomes a tree, and bears fruit; and therefore, without any hyperbole, says our author, I may affirm, that I never saw such a luxuriant verdant soil, nor woods full of such odd, large, and lofty trees, nor trees that yield more sustenance to man, in any part of the world. However, these islands, besides the inconveniences mentioned above, are also subject to earthquakes, which are sometimes very fatal.

The whole number of them is said to be 1100.

PHILIPPINES, a religious society of young women at Rome, so called from their taking St Philip de Neri for their protector. The society consists of 100 poor girls, who are brought up till they are of age to be married, or become nuns, under the direction of some religious women, who teach them to read, write, and work, and instruct them in the duties of Christianity. They wear a white veil, and a black cross on their breasts. See MACEDONIA.

PHILIP II. king of Macedon, and father of Alexander the Great; equally renowned as a legislator, politician, and warrior. After having conquered Greece, he meditated the conquest of Persia; but while

Philippines
Philip.

Philip,
Philips.

he was preparing for this expedition, he was assassinated at a banquet by Pausanias, a captain of his guards, in 336 B. C.

PHILIP II. king of Spain, a celebrated politician, but a cruel tyrant through bigotry, by which he lost the 17 provinces of Flanders belonging to the crown of Spain, seven of which form the republic of Holland, and the other ten are subject to France and Austria. For his marriage with Mary queen of England, and his invasion of England under Elizabeth, see the article ENGLAND. He was born in the year 1527, and died in 1588.

PHILIPS (Ambrose), an English poet, was descended from a very ancient and considerable family of that name in Leicestershire. He received his education at St John's college, Cambridge; during his stay at which university, he wrote his pastorals, which acquired him at the time so high a reputation. His next performance was, *The life of Archbishop Williams*, written, according to Mr Cibber, to make known his political principles, which, in the course of it he had a free of opportunity of doing, as the archbishop, who is the hero of his work, was a strong opponent to the high-church measures.

When he quitted the university, and came to London, he became a constant attendant at, and one of the wits of, Button's coffee-house; where he obtained the friendship and intimacy of many of the celebrated geniuses of that age, more particularly of Sir Richard Steele, who, in the first volume of his *Tatler*, has inserted a little poem of Mr Philips's, which he calls a *Winter Piece*, dated from Copenhagen, and addressed to the earl of Dorset, on which he bestows the highest encomiums; and, indeed, so much justice is there in these his commendations, that even Mr Pope himself, who had a fixed aversion for the author, while he affected to despise his other works, used always to except this from the number.

The first dislike Mr Pope conceived against Mr Philips, proceeded from that jealousy of fame which was so conspicuous in the character of that great poet; for Sir Richard Steele had taken so strong a liking to the pastorals of the latter, as to have formed a design for a critical comparison of them with those of Pope, in the conclusion of which the preference was to have been given to Philips. This design, however, coming to Mr Pope's knowledge, that gentleman, who could not bear a rival near the throne, determined to ward off this stroke by a stratagem of the most artful kind; which was no other than taking the same talk on himself; and, in a paper in the *Guardian*, by drawing the like comparison, and giving a like preference, but on principles of criticism apparently fallacious, to point out the absurdity of such a judgment. However, notwithstanding the ridicule that was drawn on him in consequence of his standing as it were in competition with so powerful an antagonist, it is allowed, that there are, in some parts of Philip's pastorals, certain strokes of nature, and a degree of simplicity, that are much better suited to the purposes of pastoral, than the more correctly turned periods of Mr Pope's veneration. Mr Philips and Mr Pope being of different political principles, was another cause of enmity between them; which arose at length to so great a height, that the former, finding his antagonist too hard for

him at the weapon of wit, had even determined on making use of a rougher kind of argument; for which purpose he even went so far as to hang up a rod at Button's for the chastisement of his adversary whenever he should come thither; which, however, Mr Pope declining to do, avoided the *argumentum baculinum*, in which he would, no doubt, have found himself on the weakest side of the question. Our author also wrote several dramatical pieces; The Briton, Distressed mother, and Humphrey duke of Gloucester; all of which met with success, and one of them is at this time a standard of entertainment at the theatres, being generally repeated several times in every season. Mr Philip's circumstances were in general, through his life, not only easy, but rather affluent, in consequence of his being connected, by his political principles, with persons of great rank and consequence. He was concerned with Dr Hugh Boulter, afterwards archbishop of Armagh, the right honourable Richard Welb, esq; lord chancellor of Ireland, the reverend Mr Gilbert Burnet, and the reverend Mr Henry Stevens, in writing a series of papers called the *Free Thinker*, which were all published together by Mr Philips, in three volumes in 12mo.

In the latter part of queen Anne's reign, he was secretary to the Hanover club, who were a set of noblemen and gentlemen who had formed an association in honour of that succession, and for the support of its interests, and who used particularly to distinguish in their toasts such of the fair sex as were most zealously attached to the illustrious House of Brunswick. Mr Philips's station in this club, together with the zeal shewn in his writings, recommending him to the notice and favour of the new government, he was, soon after the accession of king George I. put into the commission of the peace, and appointed one of the commissioners of the lottery. And, on his friend Dr Boulter's being made primate of Ireland, he accompanied that prelate across St George's channel, where he had considerable preferments bestowed on him, and was elected a member of the House of Commons there, as representative for the county of Armagh. At length, having purchased an annuity for life of 400*l. per annum*, he came over to England some time in the year 1748; but having a very bad state of health, and being moreover of an advanced age, he died soon after, at his lodgings near Vauxhall, in Surry.

PHILIPS (Catherine), a very ingenious lady, the daughter of Mr John Fowler merchant; was born at London, in January 1631, and educated at a school at Hackney. She married James Philips of the priory of Cardigan, esq. and went with the viscountess of Dungannon into Ireland, where she translated Corneille's tragedy of *Pompey* into English, which was several times acted there with great applause. Her poems were first printed in the year 1664, tho' without her consent; and after her death a small volume of her letters to Sir Charles Cotterel, was published under the title of *Letters from Orinda to Poliarchus*. She died of the small-pox in London, in June 1664. Besides the above, she translated from the French of Corneille, part of the tragedy called *Horace*, which Sir John Denham completed by adding the fifth act; and soon after her death, her poems and translations were published in a folio volume. This lady, who had few per-

Philip

personal graces, was greatly admired for her abilities and many virtues; and was particularly esteemed by several persons of quality and distinction, amongst whom were those illustrious peers, the duke of Ormond, the earls of Orreary and Roscommon, and Dr Taylor bishop of Downe and Connor. Mr Dryden more than once mentions her with honour; and Mr Cowley wrote an excellent ode upon her death.

PHILIPS (John), an eminent English poet, was born in 1676. He was educated at Winchester and Oxford, where he became acquainted with Milton, whom he studied with great application, and traced in all his successful translations from the ancients. The first poem which distinguished our author, was his *Splendid Shilling*, which is in the *Tatler* styled *the finest burlesque poem in the English language*. He wrote also a poem upon Cyder, founded on the model of Virgil's *Georgics*; which is an excellent performance in its kind: with several other pieces. He was beloved by all who knew him; somewhat reserved and silent amongst strangers, but free, familiar, and easy with his friends. He died young, in 1708.

PHILISTÆA (anc. geog.), the country of the Philistines, (Bible); which lay along the Mediterranean, from Joppa to the boundary of Egypt, and extending to inland places not far from the coast. *Palestini*, the people; *Palestina*, the country; (Josephus): Afterwards applied to the whole of the Holy Land and its inhabitants. *Philistæi*, the people, (Septuagint); *Philistini*, (Vulgate); the *Caphtorim* and *Philistim*, originally from Egypt, and descendants of Cham, (Moses). Expelled and destroyed the Hivites the ancient inhabitants, and occupied their country; that is, the region which retained the name of *Philistim*, in which that of *Caphtorim* was swallowed up.

PHILLYREA, mock-PRIVET; a genus of the monogynia order, belonging to the diandria class of plants. There are seven species, all of them shrubby plants, natives of France and Italy, rising from five to 18 or 20 feet high, adorned with small clusters of white

or herbaceous flowers. They are very hardy, and will thrive in any soil or situation.

PHILO, a celebrated Jewish writer of the first century, was born of a distinguished family at Alexandria, and was the chief of the deputation sent by the Alexandrian Jews to the emperor Caligula against the Greek inhabitants of the same city, about the year 40. This deputation was without effect; Caligula gave him audience, heard him, and refused to grant his demands. Philo himself wrote a curious account of this embassy, under the title of, *A discourse against Flaccus*. There are also extant several other of his works, divided into three parts; the first of which relates to the Creation of the World, the second is on the Sacred History, and the third on the Laws and Customs of the Jews; all of which are written in elegant Greek, and interspersed with excellent moral sentiments and allegories. Philo so closely imitated Plato's style and doctrines, that he has been furnished the *Jewish Plato*. The best edition of his works is that of London, printed in 1742, by Dr Mangey, in Gr. and Lat. 2 vols folio.

PHILOCTETES, in fabulous history, the son of Pæon, was the faithful companion of Hercules; who at his death obliged him to swear not to discover the place where his ashes were interred, and presented him with his arrows dipped in the Hydra's blood. The Greeks at the siege of Troy, being informed by an oracle that they could never take that city without those fatal arrows, went to Philoctetes, and insisted upon his discovering where he had left his friend; when Philoctetes, to evade the guilt of perjury, let them know where Hercules was intombed, by stamping upon the place: but he was punished for the violation of his oath, by dropping an arrow upon that foot; which, after giving him great agony, was at length cured by Macao. He was afterwards taken by Ulysses to the siege of Troy, where he killed Paris with one of his arrows.

PH I L O L O G Y.

UNDER the term PHILOLOGY, some comprehend universal literature; so that each one may there include whatever he thinks proper; as grammar, rhetoric, poetry, antiquities, history, criticism, the interpretation of authors, &c. This seems to be not only making an abuse of words, but creating confusion in those matters where too much regularity and precision cannot be observed. The term *philology* is composed of the Greek words *φιλο* and *λογος*, which imply "a love or study of languages." It appears, therefore, that philology is nothing more than a general knowledge of languages, of the natural and figurative signification of their words and phrases, and, in short, of all that relates to expression in the different dialects of nations, as well ancient as modern.

As, in treating of GRAMMAR, we have given those general rules which are applicable to all possible languages; we shall here confine our observation to the languages themselves, and to those general ideas which philology offers, without leading our readers thro' all the paths of an immense labyrinth.

Languages in general may be divided into,

1. *Ancient languages*; which are those that have become extinct with the people who spoke them, or have been so altered and disfigured that they no longer resemble the languages which were spoken by those people.

2. *Oriental languages*; the study of which is necessary in order to the understanding of the text of the holy scriptures, especially the Old Testament.

3. *Learned languages*; which are those that are indispensably necessary in the study of erudition, and particularly literature; which, while there were people in the world who made them their common language, were called *living*; but as no nation now makes use of them, they are called *dead languages*, and are therefore to be learned from books or in schools.

4. *Modern languages*: in which are distinguished, first, the common languages of the European nations; and secondly, the languages of the people who inhabit the three other parts of the world.

SECT. I. *Ancient languages.*

I. Of the languages that were spoken by the first inhabitants of the world, till the destruction of the tower of Babel, there are not now the least traces remaining; though some zealous theologians pretend that it was the Hebrew as it is found in the Bible, or at least the ancient Chaldean: but all this is mere conjecture; and it is certain, on the contrary, that every vestige of those languages has been totally destroyed by time. The ancient languages that have been in use in the different parts of the world since that period, and the knowledge of which, more or less imperfect, has come down to us, are,

1. The Chaldean.
2. The Syriac and Estrænetic,
3. The Arabic.
4. Coptic or ancient Egyptian.
5. Ancient Ethiopian.
6. Ancient Indian.
7. Ancient Phœnician, which is also called the *Ionian Phœnician*.
8. Punic or Carthaginian.
9. Scythian, and the Scythian of the Huns.
10. Cyrillian.
11. Glagolitic.
12. Braminian or Brachmanian.
13. Æolian or Æolic.
14. Jacobitian.
15. Celtic.
16. Saracen.
17. Ancient Eclavianian.
18. Gothic.
19. Hetrufcan.
20. Mangiurian; of which the Maronites, Nestorians, and sometimes the Jacobites, made use.
21. Hieroglyphic.
22. Runic.
23. Ancient Vandalian.
24. Ancient Germanic.

And perhaps some others that may be known to philologists. To these may be added,

25. The different alphabets, idioms, and methods of speaking and writing in the middle age.

Philology is therefore employed in making learned researches, not only into these languages, but into many others, which we shall enumerate in the course of this article. It prescribes rules, lays down precepts, points out principles, furnishes etymologies, and makes all the necessary remarks for the understanding and attainment of every known language. It shows the use that may be made of each particular language; in what country, and by what people, it has been spoken; and explains, as far as is possible, all the obscurities and ambiguities that attend the study of each language.

When the alphabet of a language is once discovered and well understood, we may easily attain, or at least with much less difficulty, the knowledge of the rest. Beside numberless philological works, with which each library is crowded, they have, in Germany, a small treatise that is very curious and very instructive, intitled, *The new A. B. C. in a hundred languages*; or, "Fundamental instructions for teaching the youngest scholars not only German, Latin, French, and Italian,

but also the oriental and other languages, as well as the pronunciation and knowledge of these different languages." Leipzig, published by Gesner, 1743. In this book are contained the alphabets and first elements of a hundred different languages, as well ancient as modern. This work was reprinted in 1740, and very considerably augmented, under the title of, *The master of the oriental and occidental languages*. To this has been added the Lord's prayer, in two hundred languages ancient and modern, in the characters proper to each, with the dialect or manner of pronouncing the prayer; which contributes greatly to facilitate the attaining an idea of these languages. The author of this equally curious and instructive book is M. John Frederic Frits; and he was assisted by the Danish missionary Schults of Hall. The successors of Homann of Nuremburg have also published four geographico-philological maps, designed by Godfrey Henfel, which bear the following titles: 1. *Europa polyglotta, linguarum genealogiam exhibens, una cum litteris scribendique modis omnium gentium*: 2. *Asia*; 3. *Africa*, with the same title; and, 4. *America, cum supplementis polyglottis*. The four parts of the world are engraved and coloured on these maps; but in every country, instead of the names of its cities and provinces, is seen the beginning of the Lord's prayer, in the characters used in that country; so that, with a single glance of the eye, we see all the languages that are in use in all parts of the known world. These maps are highly curious, and have doubtless cost the inventors immense labour.

Books which teach the particular rules of a language called *grammars, rudiments, &c.*; and those that contain the words and phrases, *dictionaries, lexicons, lexical manuals, vocabularies, &c.* Philology shews the manner in which these books are to be made, and the precautions that are to be observed to render them instructive and agreeable; the method of treating synonymous terms, the gradations that are among words seemingly synonymous, and many other like matters. It shews also the reciprocal influence which the genius and manners of a people have on their language; and their language on their general method of thinking; their manners, urbanity, and refinement.

But as it is impossible to perceive all the force and elegance of the various allusions, metaphors, and comparisons in a language, especially in an ancient language, if we are not properly instructed in their manners, customs, ceremonies, laws, arts, sciences, and professions, and other peculiarities of the nation by whom they have been used, and whose natural idiom they formed, Philology, in order to know the true origin, etymology, and signification of the words, terms, and phrases of a language, remounts to the most distant ages, and, employing all the aids it can receive from literature, it makes use of antiquities, numismatics, and diplomatics, in fixing the meaning of each term and mode of expression, and by these means renders languages and authors intelligible, clear, and agreeable.

These languages, which are no longer in common use, can only be learned by books or manuscripts. But as these have come down to us by the means of copying, they have consequently been frequently mutilated, altered, diminished and disfigured, by those who

Oriental Languages. who have copied them; the text, in general, or at least many passages of these books and manuscripts, is unintelligible at the first reading. From hence there has arisen in modern Europe a particular science, that is called the *Criticifm of Languages*, which makes a part of philology, and is employed, 1. In examining the authenticity and truth of the text; 2. In discovering and pointing out the means of correcting the text; 3. In restoring such passages as have been altered, omitted, or mutilated; 4. In explaining the true sense of the text; and, 5. In establishing a language by these means in its full primitive perfection, and making it perfectly intelligible to modern times. The celebrated M. le Clerc has given us an admirable work on this subject, intitled *Art Critica*, in which he explains, with equal genius and solidity, the rules of found philological criticism.

That which is of the greatest use in understanding and interpreting an obscure or imperfect passage, or an unintelligible word or phrase, is *confrontation*. The best confrontation is that which is made by comparing an author, book, or manuscript, with itself; by examining if the same word, matter, or phrase, is not repeated elsewhere, or in equivalent expressions. This is the most certain method, and produces an authentic interpretation. The second method is to confront a writer with his cotemporaries of the same nation: and the third consists in comparing him with other authors who have written at different times, and in the same language.

SECT. II. *Oriental Languages.*

THOUGH most of the languages we have enumerated in the preceding section, and many of those we shall mention in the fourth, have been, or are still, in use in the eastern countries, we here understand, however, by the term *oriental*, those only which are essentially necessary to the understanding, and interpreting, in an exegetic manner, the holy writings, especially those of the Old Testament; and for this restriction of the term we have the authority of a great number of learned men, who by the oriental languages understand only the Hebrew, Chaldean, Syriac, Arabic, and Coptic: to which we shall add the Samaritan, Rabbinic, and Talmudic. These eight languages merit a more particular examen, as they serve to establish the foundations of the Christian religion, and make a considerable part of the study of a Theologian.

1. The Hebrew, Arabic, and Chaldean, respectively claim the right of seniority: each of them has its advocates; and the point is not easy to be decided. Most zealous divines are inclined to favour the Hebrew; and there are some of them who pretend that it was the language in which God talked with Adam in paradise, and that the saints will make use of it in heaven in those praises which they will eternally offer to the Almighty. These doctors seem to be as certain with regard to what is passed as what is to come. Some philologists give the priority to the Arabic, and others to the Chaldean. This difference is the more difficult to be reconciled, as Moses was not born till 2464 years after the creation, and in Egypt; that is to say, 700 years after the destruction of the tower of Babel, when all languages were mixed and confounded;

for we have no proof, nor even any account, that the Hebrew was exempted, and preserved its purity amidst the general confusion. There is not, moreover, at this time, any one work of antiquity existing that is wrote in Hebrew, except the Old Testament; and of that there are even some parts in Chaldaic; and words of that and other languages are to be found dispersed in different parts of it.

There is one more remark we must here make. The first time we find the word *Hebrew* in the Bible, is in the 13th verse of the xivth chapter of Genesis; and it is manifest that Abraham and his descendants took that name from the patriarch *Heber*, the son of *Salah*, and third grandfather of Abraham: it is therefore evident, that in the time of Abraham this name was that of a family, and not of a people who had a separate language. We are therefore to suppose, that Abraham, and the patriarchs after him, spoke the customary language of the country where they lived: that this language changed by degrees, as all living languages have done and ever will do: that Jacob and his sons having passed into Egypt, they and their descendants, under the name of the *Children of Israel*, did not preserve the language of their fathers in all its purity; but that they mixed with it many expressions borrowed from foreign languages, and especially from the Egyptian and Coptic: that Moses wrote in the Hebrew language, as the children of Israel then spoke it: that the other books of the Old Testament were wrote still later; and that it is almost impossible for this language to have been preserved without any alteration.

As we have no Hebrew but what is contained in the Holy Bible, this language must naturally be deficient of many words; not only because all the ancient languages, but especially those of the first ages, were not so copious as the modern; but there were in those times fewer objects to be named; and the sacred authors moreover had not occasion to treat on all subjects. The Hebrew language, however, is susceptible of all the ornaments of diction, and is very expressive. It is not, beside, so difficult to learn as some have imagined. The style of the Psalms, of the book of Job, and of all that is written in a poetic manner, is the most difficult to understand. That of Isaiah is noble and elegant, worthy of an author who was of the house of David, and the nephew and grandson of a king. But, notwithstanding all the labours of the learned for so many centuries, we are very far from having a perfect knowledge of the Hebrew language: this inconvenience is the greater, as it gives occasion to many imperfect translations, which disguise the true sense of the original text; and, what is still more, they have founded, on these passages wrong interpreted, a belief of events that have never arrived in the manner predicted; and even sometimes religious dogmas.

The Hebrew language had originally no vowels. They are marked in the massorets by points under the consonants. This language is written and read from the left to the right: it has thirteen letters, which grammarians divide into guttural, palatic, dental, labial, and gingival. They now distinguish only five vowels in Hebrew, which are the same as ours, *a, e, i, o, u*. But they divide each vowel into two or

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three; as *long, short, shortest*. The articles, pronouns, &c. are placed after the substantive; and the same word is sometimes substantive, adjective, and verb. The punctuation and accent are the objects that require the greatest attention in the Hebrew language: they count near forty accents; and there are many whose use is still unknown. They serve in general to distinguish, 1. The period and its members, as the points do in other languages; 2. To determine the quantity of syllables; and, 3. To mark the tone that is to be observed in chanting them. Nineteen of these accents are also called, by grammarians, *disjunctivi* or *accentus regii*; and the others *conjunctivi, servi, or ministri*. There is, properly speaking, only one conjugation in this language, which is of itself simple, but is varied in each verb by seven or eight different manners, that form in fact so many different conjugations, and give a great number of expressions, to represent by one word the various modifications of a verb. These are the principal characteristics of the Hebrew, as we find it in the Holy Scriptures; and which, taken all together, forms a very regular and analogous language.

II. The *Chaldean* is that which was spoken in Chaldaea. Some say that it is a dialect derived from the Hebrew, and others that the Hebrew is a dialect of the Chaldean. This language has twenty-five letters; the forms of which are very different from the Hebrew. It is in like manner wrote from the left to the right.

The *Syriac* is also considered as a dialect of the Hebrew. It has twenty-two letters, which have the same names with the Hebrew, but are of very different forms.

The *Arabic*, or the language of the Arabians, is in like manner a dialect of the Hebrew. It has twenty-eight letters, the names of which have a good deal of resemblance to the Hebrew; but their characters are all very different.

The *Coptic* is the ancient language of the Egyptians, but mixed in process of time with much of the Greek. We have already said, in the preceding section, that the late M. de la Croix has in a manner re-established this language, when we scarce knew more than the name of it; and that he has composed a Coptic grammar and dictionary. F. Kircher, it is true, had before published a Coptic vocabulary and kind of grammar, but very incomplete. There are thirty-two letters in its alphabet, but the characters are almost entirely Greek. There has been no book found in this language but translations of the Holy Scriptures, or ecclesiastical offices, &c.

III. The *Samaritan* is another dialect of the Hebrew. The Samaritans were Jews, and their city Samaria was in Judea. They followed the law of Moses with more rigour, more after the letter than the Hebrews. There is a Samaritan copy of the Pentateuch, which differs indeed but little from that of the Jews in Hebrew: but it is written in different characters, that are commonly called *Samaritan*; and which Origen, St Jerom, and many other writers, as well ancient as modern, suppose to be the first letters of the Hebrews. There are also medals that are called *Samaritan*; they have Hebrew inscriptions, in characters different from those of our Hebrew Bible,

and which are called *square Hebrew*. For a further account of the Samaritan language, consult M. Simon in his customs and ceremonies of the Jews, Eduard Bernhardt Lexicon Samaritanum, F. Kircher, M. Buxtorff, M. de Spanheim, F. Morin, M. Walton, and a great number of others writers.

IV. The *Rabbinic*, or the Hebrew of the Rabbins, is the language of which they have made use in their works. The body of it is composed of Hebrew and Chaldaic, with divers alterations in the words of those two languages, whose significations they have much extended. They have likewise borrowed greatly from the Arabic. The rest is composed of words taken from the most part from the Greek, with some from the Latin, and others from various modern languages, especially that of the country in which each rabbin lived. For we should remember here, that after the return from the last captivity, they spoke scarce any pure Hebrew at Jerusalem and in Judea, but Greek mixed with some Hebraic expressions: the Romans afterward entering Palestine, and becoming conquerors of that country, spoke their own language there; and at last the Jewish nation was totally dispersed. We shall only add, that the Rabbinic is a very copious language; and that there is scarce any part of science of which the Rabbins have not treated, but always with an enthusiasm that is natural to them: there have been among them even poets and orators.

V. The *Talmudic* is another dialect or particular idiom of the Hebrew, in which the Talmud, or the book composed by the Jews, that contains all the explications of their law, is written. This language differs greatly from the pure Hebrew. M. Buxtorff has composed a Chaldaic, Talmudic, and Rabbinic dictionary. We have also a work of the emperor Constantine, intitled *Clavis Talmudica*; and one of Otto, called *Vita doctorum misinorum*; beside several others.

SECT. III. Of those Languages that are called dead.

LANGUAGES in general, properly speaking, form no science that can enrich the mind with real knowledge, but are to be considered as introductions to the sciences; as keys that open to us the sanctuaries of erudition. In order to attain the knowledge of antiquity in its full extent, the knowledge of those languages that were then in use is of great utility: and properly to judge of modern nations, it is almost indispensably necessary to be acquainted with the principal languages which are now used in the world. There are two languages, however, which are called learned by way of eminence, and those are the Greek and the Latin. The former of these not only enables us to read the masterly productions of genius of ancient Greece, but also to form a true judgment of all its antiquities, and of its different ages, which form the most entertaining and interesting periods for the sciences and polite arts of all ancient times. The latter affords us the means of understanding the original texts of all the admirable works of the most celebrated Latin authors, and of becoming acquainted with the city, republic, and monarchy of Rome, as if we had been present with them; and of forming a solid judgement of those precious Roman antiquities of every kind that are still remaining among us.

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But that which has given the Latin an advantage even over the Greek itself, that has rendered it indispensable to every man of letters, and has made it the basis of erudition, is, that during the middle age, and in general in all modern times, the learned of all Europe have made it their common and universal language; so that the Latin forms, if we may use the expression, the natural language of the sciences.

I. All that is written in *Greek* cannot be properly said to be in the same language; for we should carefully distinguish,

(1.) The ancient or literal Greek: an admirable language, in which are written the works of Xenophon, Thucydides, Demosthenes, Plato, Aristotle, Homer, Sophocles, &c. works that have preserved this language in all its purity, and that will make it, with themselves, immortal. There are, however, several idioms or dialects in this tongue, among which four are reckoned principal; and these are, 1. The Attic, which is the most esteemed; 2. The Ionic; 3. The Æolic; and, 4. The Doric; which was a kind of rustic dialect, and in which are written eclogues, idyls, and other pastorals. We must observe by the way, that all these four dialects are to be found in Homer, and produce an odd effect in an heroic poem, notwithstanding the universal approbation that is given to this poet. The Greek language is very copious in words, and its inflexions are as various as they are simple in most modern languages. It has three numbers; the singular, dual, and plural; and many tenses in its verbs, which afford great variety of expression. The use of the participles of the aorist, and of the preterite, and of compound words, which are very numerous in this language, give it force and brevity, without in the least diminishing its perspicuity. Proper names have also a meaning in this as in the oriental languages; and the learned there find likewise the character of their origin. The dialect itself, or the pronunciation, is sonorous, soft, harmonious, and delightful: in a word, the Greek is the language of a polite nation, that had a taste for all the arts and sciences.

(2) The Greek of the middle age. The ancient Greek ended at the time that Constantinople became the capital of the Roman empire; though there were after that time several works, and some by the fathers of the church, which were wrote in Greek, and with sufficient purity: but as theology, law, civil and military policy, the alteration of customs and manners, &c. introduced successively a great number of words that were before unknown, these novelties by degrees altered and corrupted the language. The natural elegance of the ancient Greek was no longer to be found. Those men of exalted genius, who constantly give a true beauty to a language, were no more. And what could be expected from a barbarous age, and from authors that were even below a moderate capacity?

(3.) The modern or vulgar Greek. It commenced at the taking of Constantinople by the Turks, and is the language that is now commonly spoke in Greece, without any regard to improvement. The wretched state to which the Greeks are reduced by the Turks, renders them indolent, and, by a necessary consequence, ignorant. The policy of the Ottoman Porte does not permit its subjects to apply themselves to

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study; and that same spirit which has destroyed the finest monuments of antiquity, which has made, of columns of porphyry and granite, balls for their cannons, has caused the decay and total destruction of the sciences. The principal difference between the ancient and vulgar Greek consists in the terminations of their nouns, pronouns, verbs, and other parts of speech. There are also in the modern many words that are not to be found in the ancient Greek; particles that appear to be expletives, and which custom alone has introduced to distinguish certain senses of their verbs; names of employments and dignities unknown to the ancient Grecians, and a great number of words taken from modern tongues: which altogether form a spurious language, a kind of jargon. There is a glossary of this language compiled by du Cange.

(4.) The Greek of the New Testament. The Greek of the Evangelists and Apostles is very different from that of Thucydides, Xenophon, and Demosthenes. At the time of the birth of our Saviour, Greek was commonly spoken in Judea; for after the last captivity, the people no longer understood Hebrew: their Greek, however, was corrupted; mixed with a great number of Hebraisms; with words and terms that related to the worship, to the laws, policy, manners, and customs of the Jews; by which means it became a vulgar language, a provincial and rude dialect, in comparison of the ancient or literal Greek. He that understands the New Testament, will not in consequence understand Homer. It may appear surprising, that Josephus, the Jewish historian, who lived at the time of the destruction of Jerusalem, about 40 years after the death of Christ, should be able to write Greek with so much purity and elegance: but he was at once a courtier, a minister, a general, and a man of letters; had studied the Greek language, and had spoken it at the court of Vespasian in Rome. For the same reason, St Paul also wrote better Greek than the Evangelists and other Apostles.

From all that has been said, it is apparent how much utility attends the study of the Greek tongue, and how much reason the English have for applying themselves to it from their early youth. There are, moreover, in modern languages, an infinity of terms in the arts and sciences, as most of those in astronomy, mathematics, physics, anatomy, botany, and the names of many machines, instruments, and other modern inventions, that are either altogether Greek, or derived from it; which renders this language in a manner indispensable to a man of real learning. We cannot, lastly, determine if modern nations pronounce the Greek language in the manner that the ancient inhabitants of Greece did; but it is very probable, that if Demosthenes or Aristides were now to come upon the earth, they would be very far from understanding what our learned men should say to them in Greek.

II. The *Latin* is the second of those languages that are called dead. It was first spoke in Latium, afterwards at Rome; and by means of the Latin church, and of the labours of the learned, has come down to us. The Latin is not an original tongue; but is formed of the Greek, and especially of the Æolian dialect, and of many words taken from the languages of the Osce, the Hetrurians, and several other ancient

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nations of Italy. It has had different periods of improvement and decadency, which form its different ages.

1. The first age comprehends the ancient Latin that was spoke in Latium, and cultivated at Rome from its first foundation, under the reigns of its kings, and in the first ages of its republic. At the beginning, the Latin tongue was, so to say, inclosed within the walls of Rome; for the Romans did not commonly permit the use of it to their neighbours, or the people they conquered: but when they came to perceive how necessary it was for facilitating their commerce, that the Latin tongue should be spoken every where, and that all nations in subjection to their empire should be united by one common language, they then obliged those they conquered to adopt their language. It is easy to conceive what must have been the original language of a set of freebooters, without manners, and without arts or sciences: this jargon must beside have been necessarily mixed with the language of the Sabines, from whom they stole their wives, and with those of several other foreign nations whom they had conquered, or who were incorporated with their republic. But in proportion as the Romans became polished, their language became refined. There are but very few works of the first age now remaining; among which are reckoned those of Ennius, &c.

2. The second age of the Latin language began about the time of Cæsar, and ended with Tiberius. This is what is called the *Augustan age*, which was perhaps of all others the most brilliant. A period at which it should seem as if the greatest men, and the immortal authors, had met together upon the earth, in order to write the Latin language in its utmost purity and perfection. This age, and the language of this age, are so well known, and we have so great a number of works produced at this period, as makes it unnecessary for us to say any thing further of it here.

3. The third age begins with the reign of Tiberius. Seneca seems to have contributed not a little to have deprived the Latin language of its energy and dignity, and to have substituted the little tricks of style in its stead, and sometimes those childish expressions which the Italians call *conceetti*. Even Tacitus appears not to have been quite free from these faults; for his concise and sententious style is not that of the golden age; nor likewise is that of the poet Lucian.

4. The fourth age of the Latin tongue is that of the remainder of the middle age, and the first centuries of modern times; during which this language fell by degrees into so great a decadency, that it became nothing better than a barbarous jargon. It is to the style of these times that is given the name of *low Latin*; and in fact it was so corrupted, altered, and mixed with foreign expressions, that M. du Cange has formed a voluminous glossary, which contains those words and phrases only that are used in the Low Latin, and which we should not be able to understand without such helps. What indeed could be expected from this language, at a time when the barbarians had taken possession of all Europe, but especially of Italy; when the empire of the East was governed by idiots; when there was a total corruption of morals; when the arts and sciences were in a manner annihilated; when the priests and monks were the only men of let-

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ters, and were at the same time the most ignorant and futile mortals in the world. Under these times of darkness, we must therefore rank that Latin which is called *lingua ecclesiastica*, and which we cannot read without disgust.

5. The fifth and last age of the Latin tongue is that which began with the 16th century, and was that of Leo X. Charles V. Francis I. Henry VIII. of England, &c. A happy period, and ever memorable for the reformation of letters, of arts and sciences, of manners, and of the powers of the human mind, which till then seemed to have remained in a perpetual stupor. It is necessary to remember here, that the art of printing was not invented till about the year 1441; and that the manuscripts of the ancient Greek and Latin authors were become extremely scarce, and highly valuable; so that but few private persons were able to procure them, and to study the Latin of the Augustan age. But since that time we have had many Latin works, as well in verse as prose, in a style that we cannot sufficiently admire, and which, though not altogether so pure and elegant as those of the golden age, yet are not much inferior.

There are, however, in the Latin, and in all dead languages, two great inconveniences which continually attend them with regard to modern ages. The first consists in the pronunciation. As to what concerns the Latin, each nation pronounces it after the manner of its own language, and each of them imagines their pronunciation to be the best. It may be proved, however, by many arguments, that no man now upon earth pronounces Latin in the same manner as did Horace and Cicero. The second inconvenience is the deficiency of the Latin language with regard to us, as it has no terms whereby to express those inventions and discoveries of every kind that have been made since the existence of the Roman empire. There are no Latin words for any of the furniture that surrounds us, for three-fourths of the dishes that come upon our tables, for the dresses we wear, for our instruments of war and navigation, for civil and military employments, and, in a word, for all our daily occupations. It is dull enough to hear our authors call a cannon *bombarda*; a peruke, *capilamentum*; and a button of our cloaths, *globulus*, &c. Whoever shall doubt the propriety of this observation, need only read the essays that some able Latinists have made in our days to write gazettes in that language, and they will there see the pains those writers have taken, and the ill success they have had. We shall say no more of a language which every scholar learns from his infancy, which is taught over all Europe in schools and colleges, and of which there are grammars, dictionaries, and other instructive books without number.

SECT. IV. Modern Languages.

If we call all the different dialects of the various nations that now inhabit the known earth, languages, the number is truly great; and vain would be his ambition who should attempt to learn them, though but imperfectly. We will begin with naming the principal of them: There are three which may be called original, or mother-languages, and which seem to have given birth to all that are now spoken in Europe. These are the *Latin*, *German*, and *Slavonian*. From
the

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the Latin are derived the languages of all those nations countries which inhabit the southern and most western countries of this part of the world. From the German, all those of the nations that inhabit the centre and the northern regions; and from the Slavonian, all the languages of the people who dwell in the most eastern part of Europe. The Slavonian is extended even to Asia, and is spoken from the Adriatic sea to the northern ocean, and almost from the Caspian sea to Saxony. But it must not be imagined from the term *original*, which is given to these languages, that they have come down to us from the confusion at Babel without any alteration. No; we have already shown, in the preceding section, of what languages the Latin was formed. With regard to the German, it may be very justly supposed to have been the ancient language of the inhabitants of Germany, as the names of their divinities and heroes (*Mann, Erta, Hermann*, &c. appellative names; which still signify "man, earth, chief of an army," &c.) seem to confirm that opinion. But it is indubitable, that the ancient German has been mixed and corrupted by the languages of those northern nations which in the fourth century deluged Europe; and who, when they penetrated Italy and Africa, did not merely pass through Germany as an army that marches in regular order, but remained there a considerable time, and mixed with the natives of the country. All these Scythian or Celtic people acquired likewise in Germany the name of *Allamandi*, or "Germans:" some were called *Goths*, that is, "good;" others *Quades*, or "bad;" others *Huns*, or "dogs;" others *Normans*, or "men from the north;" and so of the rest. And those nations were from that time known and distinguished by these denominations.

I. With regard to the Slavonian, it is supposed to be in part the ancient language of the Celtes or Scythians, mixed with some particular dialects of different eastern nations. But be that as it may, these three languages appear to have produced the following modern tongues:

From the *Latin* came,

1. The Portuguese.
2. Spanish.
3. French.
4. Italian.

From the *German* or *Allamandi*,

5. The modern German; which so little resembles the ancient, that it is with difficulty we read the authors of the 14th century.
6. The low Saxon or low German.
7. The Dutch.
8. The English; in which almost all the noun-substantives are German, and many of the verbs French, Latin, &c. and which is enriched with the spoils of all other languages.
9. The Danish.
10. The Norwegian.
11. Swedish.
12. Dalecarlian.
13. Laplandish.

From the *Slavonian*,

14. The Polonese, with a mixture of the ancient Sarmatian.

15. The Lithuanian.
 16. Bohemian.
 17. Hungarian.
 18. Transylvanian.
 19. Moravian.
 20. The modern Vandalian, as it is still spoken in Lusatia, Prussian Vandalia, &c.
 21. The Croatian.
 22. The Russian or Muscovite.
 23. The language of the Calmacs and Cossacs.
 24. Thirty-two different dialects of nations who inhabit the north-eastern parts of Europe and Asia, and who are descended from the Tartars and Huno-Scythians. There are polyglott tables which contain not only the alphabets, but also the principal distinct characters of all these languages.
- To all these may be added,
25. The modern Greek, or that which is now spoken in Greece.
 26. The modern Hebrew, or vulgar language of the Jews, which is also called the *German Hebrew*, &c. And,
 27. The jargon that is called *Lingua Franca*.

II. The common languages of Asia are,

28. The Turkish and Tartarian, with their different dialects.
29. The Persian.
30. The Georgian or Iberian.
31. The Colchic or Mingralian.
32. The Albanian or Circassian.
33. The Armenian.
34. The language of the Jews in Persia, Media, and Babylon.
35. The modern Indian.
36. The Formosan.
37. The Indostanic.
38. The Malabar.
39. The Warugian.
40. The Talmulic or Damulic.
41. The modern Arabic.
42. The Tangutian.
43. The Mungalic.
44. The language of Balabandu, and the Nigarian or Akar Nigarian.
45. The Grusinic or Grusian.
46. The Chinese.
47. The Japonese.

These languages are spoke by the Greek Christians in Asia, under the patriarch of Constantinople.

The Danish missionaries who go to Tranquebar, print books at Hall in these languages.

We have enumerated here those Asiatic languages only of which we have some knowledge in Europe, and even alphabets, grammars, or other books that can give us information concerning them. There are doubtless other tongues and dialects in those vast regions and adjacent islands; but of these we are not able to give any account.

III. The principal languages of Africa are,

48. The modern Egyptian.
49. The Fetutic, or the language of the kingdom of Fetu.
50. The Moroccan; and,
51. The jargons of those savage nations who inhabit the desert and burning regions. The people on the coast of Barbary speak a kind of Turkish. To these may be added the Chilibic language, otherwise called *Tamazeght*; the Negritian, and that of Guinea;

Guinea; the Abyssinian; and the language of the Hottentots.

IV. The languages of the American nations are but little known in Europe. Every one of these, tho' distant but a few days journey from each other, have their particular language or rather jargon. The languages of the Mexicans and Peruvians seem to be the most regular and polished. There is also one called *Poconchi* or *Pocomana*, that is used in the bay of Honduras and toward Guntimal, the words and rules of which are most known to us. The languages of North America are in general the Algonhic, Apalachian, Mohogic, Savanahamic, Virginic, and Mexican: and in South America, the Peruvian, Carabib, the language of Chili, the Cairic, the Tucumanian, and the languages used in Paraguay, Brasil, and Guiana.

V. We have already said, that it would be a vain and senseless undertaking for a man of letters to attempt the study of all these languages; and to make his head an universal dictionary of languages; but it would be still more absurd in us to attempt the analysis of them in this place: some general reflections therefore must here suffice. Among the modern languages of Europe, the French seems to merit great attention; as it is elegant and pleasing in itself; as it is become so general, we may travel from one end of Europe to the other without scarce having any occasion for an interpreter; and as in it are to be found excellent works of every kind, both in verse and prose, useful and agreeable. There are, besides, grammars and dictionaries of this language which give us every information concerning it, and very able masters who teach it; especially such as come from those parts of France where it is spoke correctly; for with all its advantages, the French language has this inconvenience, that it is pronounced scarce any where purely but at Paris and on the banks of the Loire. The language of the court, of the great world, and of men of letters, is moreover very different from that of the common people: and the French tongue, in general, is subject to great alteration and novelty. What pity it is, that the style of the great Corneille, and that of Moliere, should already begin to be obsolete, and that it will be but a little time before the inimitable *chef d'œuvre* of those men of sublime genius will be no longer seen on the stage! The most modern style of the French, moreover, does not seem to be the best. We are inclined to think, that too much concision, the epigrammatic point, the antithesis, the paradox, the sententious expression, &c. diminish its force; and that by becoming more polished and refined, it loses much of its energy.

VI. The German and Italian languages merit like-

wife a particular application; as does the English, perhaps above all, for its many and great excellencies, (see LANGUAGE.) Authors of great ability daily labour in improving them; and what language would not become excellent, were men of exalted talents to make constant use of it in their works? If we had in Iroquois, books like those which we have in English, Italian, French, and German, should we not be tempted to learn that language? How glad should we be to understand the Spanish tongue, though it were only to read the Araucana of Don Alonzo D'Ercilia, Don Quixote, some dramatic pieces, and a small number of other Spanish works, in the original; or the poem of Camoens, in Portuguese.

VII. The other languages of Europe have each their beauties and excellencies. Among these, we must not omit to mention the *Gaelic*: A language unnoticed by the learned, and almost unknown, or known only to be despised under a barbarous name*, beyond the mountains where it is spoken, till the translation of the beautiful poems of *Ossian* lately brought it out of obscurity, and presented it as an object of study not unworthy the attention either of the polite scholar or the learned philologist. See the article *OSSIAN*; also the article *GAELIC*, in the *APPENDIX*.

VIII. The greatest difficulty in all living languages constantly consists in the pronunciation, which it is scarce possible for any one to attain unless he be born or educated in the country where it is spoken: and this is the only article for which a master is necessary, as it cannot be learned but by teaching, or by conversation: all the rest may be acquired by a good grammar and other books. In all languages whatever, the poetic style is more difficult than the prosaic: in every language we should endeavour to enrich our memories with great store of words, (*copia verborum*), and to have them ready to produce on all occasions: in all languages it is difficult to extend our knowledge so far as to be able to form a critical judgment of them. All living languages are pronounced rapidly, and without dwelling on the long syllables (which the grammarians call *moram*): almost all of them have articles which distinguish the genders: all the European languages are written from the left to the right, and almost all the Asiatic from the right to the left.

VIII. Those languages that are derived from the Latin have this further advantage, that they adopt without restraint, and without offending the ear, Latin and Greek words and expressions, and which, by the aid of a new termination, appear to be natives of the language. This privilege is forbid the Germans, who in their best translations dare not use any foreign word, unless it be some technical term in case of great necessity.

P H I

PHILOMATHES, a lover of learning or science.

PHILOMELA, in fabulous history, the daughter of Pandion king of Athens, was the sister of Progne the wife of Tereus king of Thrace. That prince having ravished Philomela, cut out her tongue; and to conceal the knowledge of his incest, shut her up in a close prison: but the princess finding means to embroider her story, sent it to her sister Progne; who

P H I

thus becoming acquainted with her sister's misfortunes, delivered her from prison, and took her to the palace: then killing Itys, her son by Tereus, she served up his flesh to his father; and after he had done, exposed the child's head to his view. Tereus, in a transport of fury, pursued the sisters; but was changed into a lapwing, Progne into a swallow, Itys into pheasant, and Philomela into a nightingale.

PHILO-

PHILONIUM, in pharmacy, a kind of somniferous anodyne opiate, taking it name from Philo the inventor.

PHILOSOPHER, a person versed in philosophy; or one who makes profession of, or applies himself to, the study of nature and morality.

PHILOSOPHER'S Stone, the greatest object of alchemy, is a long-sought for preparation, which, when found, is to convert all the true mercurial part of metal into pure gold, better than any that is dug out of mines or perfected by the refiner's art; and this only by casting a little quantity thereof upon metals in fusion, whilst that part of the metal which was not mercury is immediately burnt or blown away. But this, like every other scientific chimera, will for ever elude the researches of mankind.

PHILOSOPHIC, or **PHILOSOPHICAL**, something belonging to **PHILOSOPHY**.

PHILOSOPHICAL egg, among chemists, a thin glass body or bubble, of the shape of an egg, with a long neck or stem, used in digestions.

PHILOSOPHY; the knowledge or study of nature and morality, founded on reason and experience.

The philosophers among the most ancient people of the world were called *sages* or *wise men*, as appears from history both sacred and profane. Thales and Pythagoras in Greece were the first among those that made an open profession of this science, who thought the title of *sage* too fastidious, and took the more modest name of *philosophers*, or *lovers* or *studiers of wisdom*. Thales, who was a native of Miletus in Ionia, and the first of the seven sages, was the founder of the Ionic sect; his most illustrious disciples were Anaximander, Anaximenes, Anaxagoras, and Archelaus. Anaxagoras employed himself entirely in the contemplation of the stars; and when he was asked if he had no concern for his country, replied, pointing to heaven with his finger, "I incessantly regard my country." Pythagoras founded the sect that was called *Italic*, because it was settled in that part of Italy which was called *Great Greece*, and which now makes part of the kingdom of Naples. He borrowed from the Egyptians a mysterious manner of teaching by numbers; and to that he added a certain harmony, by which he explained the perfection in all objects. He believed the world to be animated, intelligent, and round. Not knowing what to do with the soul after its separation from the body, he invented the doctrine of the metempsychosis. His disciples of greatest note were Ocellus of Lucania, Archytas of Tarentum, Philolaus of Croton, Parmenides and Zeno, both of Elea, and Melissus of Samos. Zeno was the inventor of the dialectic; the others applied themselves closely to the study of natural philosophy, and to the investigation of its principles.

Socrates followed the career of these first philosophers, but turned almost all his studies towards morality. His master was Archelaus the Pythagorean. He was the first who began to reduce the confused ideas of those who had gone before him into method; for which reason he is called by Cicero *the father of philosophy*. His life was a model of frugality, moderation, and patience; and his doctrine abounds with wisdom.

Socrates, discovering a greater genius in Plato than

in any of his other disciples, had a particular attachment to him, and his labours were not lost; for, among all the celebrated men who came out of the school of Socrates, Plato was, doubtless, the most renowned. He taught at Athens, and had in a short time many disciples. He established his school in the academy, which was a place without the town, and from thence his followers were called *Academics*. According to Plato, the soul of man is only a ray from the Divinity. He believed that this particle, united to its principle, knew all things; but when united to a body, it contracted ignorance and impurity by that union. He did not entirely neglect natural philosophy, like Socrates, but inquired into many questions which relate to that science. He believed that all things consisted of two principles, God and matter. He likewise cultivated astronomy. His morality was the same in substance with that of Socrates.

The disciples of Plato formed also many new sects. That of which Aristotle was the founder is doubtless the most illustrious. This philosopher was the first who formed, from the several parts of philosophy, a complete system. No one before him had treated separately, and from principles, the different parts of this science. He did not regard logic as a part of philosophy, but as a proper method whereby to dispose the understanding to discover the truths that it contains. The morality of Aristotle is the most perfect of all his works. His physics consist of notions and terms that are vague, and as trifling as obscure. His disciples and their followers were called the *Peripatetics* of Lyceum, where he had fixed his school.

Aristotle was not the only disciple of Plato who deviated from the sentiments of that great man: there were others who likewise placed themselves at the heads of different sects. Arcesilas was the author of a sect that was called the *Middle Academy*. He declared that there was nothing either certain or true; and that the positive and negative might be maintained in all sorts of subjects. Lacydes, who taught in the same school as Plato, 56 years after Arcesilas, was the chief of another sect that was called the *New Academy*. He acknowledged that there was a degree of probability, but that we could not assuredly know that any thing was absolutely true. Pyrrho, about the same time, placed himself also at the head of a sect. He improved on the dogma of the Academics; and maintained that it was impossible to comprehend any thing: but Pyrrho could not comprehend himself. He believed that there was nothing true, nothing but what might be said to be either this or that. His followers were called *Pyrrhonians*, or more commonly *sceptics*, because they searched without ever being able to discover any one thing.

About the same time arose two sects, who, with principles diametrically opposite, rendered themselves highly celebrated, and divided at first the wits of Greece, and afterward those of the rest of the world; and these were Zeno and Epicurus. Zeno was of Citium, a city in Cyprus. He taught in the porticoes of Athens, from whence his disciples were called *Stoics*. The most famous dogma of Zeno and the Stoics consisted in the principle of morality, which was, to live in conformity to nature, that is to say, according to the object of our desires: on this principle,

Philosophy. ciple, and on divers others, they formed the idea of a philosophy altogether extravagant, and insensible to all external objects. The physics of Zeno had nothing new but the terms. The other sect, which flourished at the same time, was that of Epicurus; and they were called *Epicureans*. This philosopher taught publicly at Athens, his native country, at the age of thirty-two years. He rejected all the chicaneries and subtilties of logic, and fought the truth by means of the senses. He attached himself greatly to morality, to which likewise tended all his other studies: and his morality was as contentaneous to the nature of man, as that of Zeno was contradictory; seeing that his first principle was, that pleasure is the pursuit of man, and that it consists in health of body and tranquillity of mind; and that it is the source and the end of a happy life, &c. Epicurus was also engaged, but with less success, in the labyrinth of metaphysics, and in physics: he adopted the system of atoms, of which Democritus was the first author. In short, malgré the evil interpretations and calumnies of his adversaries, he inculcated by his doctrine, and by his example, frugality and sobriety; and, according to him, death is not an object of terror: "For," says he, "it is nothing so long as life subsists; and when it arrives, life is no more; no man has ever felt his death."

It is evident, that these ancient systems of philosophy are at great variance with each other; and as truth is constantly uniform, it follows, that the greatest part of these opinions cannot be true. This consideration engaged Patomom of Alexandria, under the emperor Augustus, to select all that he found most rational in the doctrines of all the other philosophers, whereof he composed a system, and founded a sect; and he, for that reason, gave to his doctrine the name of the *eclectic philosophy*, from a Greek word which signifies to *select*.

The doctrine of Plato was at first in greater estimation than any of the others; and there were many celebrated Platonists under the Roman emperors down to Julian the apostate, who was himself one of them. The first Christian doctors likewise declared for this philosophy, as Justin Martyr, Tatian, Athenagoras, Origen, &c. But at length the philosophy of Aristotle, perhaps of all others the most absurd, took the lead; and truth was no longer sought for but in the writings of that philosopher. This violent fondness for his reveries began about the 12th century; at which time a philosophy was formed, that is commonly called the *scholastic*, and which is borrowed in great part from the writings of the Arabs, whom the scholastics, who were all attached to Aristotle, imitated in their subtle, ambiguous, abstract, and capricious manner of reasoning, by which they never hit the truth, but constantly went on one side, or beyond the mark. Toward the end of the 14th century, their spirits were extravagantly heated by logical distinctions, relative to that furious emulation, which was formed on the doctrine of Aristotle, between the Nominalists and Realists. The former had, for their chief, Ocham, an English cordelier, and a disciple of Scotus. They maintained, that the universal natures were nothing but words: and the others, who supported themselves by the authority of Scotus, maintained, that

the same universal natures were beings strictly real. Philosophy. These disputes divided all the universities of Europe: philosophy was no longer employed but in *operations of the intellect, conceptions, abstractions*, and such like vain subtilties; and became a mere jargon, a confused heap of unintelligible ideas.

At length, in the 16th century, philosophy began to deliver itself from the chains of terminology; men accustomed themselves to philosophize by reason, and not by verbal contention: they began to throw off the yoke, and, without entirely despising Aristotle, they no longer believed him on his word. Nicholas Copernicus, who was born at Thorn, in 1473, and died in 1543, had already borne the torch of reason in the mathematics and astronomy: he had rejected the system of the world that was invented by Ptolemy, and which the Greeks called *most wise* and *most divine*; and had published his book *De motu octavarum sphaerarum*, and his treatise *De revolutionibus*, in which he established his system of the sun's being immovable, and of the motion of the earth. Galileo, who was born at Florence in 1564, adopted the system of Copernicus, confirmed it, and improved it by new observations. This discovery of the truth cost him five or six years confinement in the prison of the inquisition. He introduced a new and excellent method of reasoning in philosophical subjects.

Peter Gassendus, professor of mathematics in Paris, also practised, in the beginning of the 17th century, a new method of philosophizing, which contributed greatly to the progress of that science. Lastly, René Descartes appeared almost at the same time; and, by a method that had been but very imperfectly understood before, discovered more truths in philosophy than all the preceding ages had produced; although, from that weakness which is natural to the human understanding, he has frequently mixed error with truth in his different systems. He treated on almost all the parts of philosophy, especially the mathematics, physics, and metaphysics. Every one is acquainted with his famous system of the *plenum* and *vortices*.

Before Descartes, Francis Bacon, baron of Verulam, chancellor of England, had exposed the errors of the philosophy of the schools, and the wretched method that was there pursued. He was one of the greatest men that has ever appeared upon the earth. It was he who lighted that torch with which all his successors have illuminated philosophy; and in his writings are to be found the seeds of every new discovery, and of every new hypothesis.

After this golden Aurora, the philosophic horizon was at once enlightened by two grand luminaries, which dispersed many of those clouds that hid the truth from mortal eyes, and diffused great lights, at last, on many objects that lay buried in obscurity. See the articles *NEWTON*, *NEWTONIAN Philosophy*, and *LOCKE*.

From the slight draught here given of the history of philosophy, we may draw the following consequences: 1. That philosophers, in their researches concerning the causes of all things, have found themselves obliged to reduce ratiocination into a system; to confine it to certain rules, and form it into an art, which they have called *Logic*. 2. That by endeavouring to explain to mankind the nature, the causes, and effects of hap-

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Philosop-
hus.

happeneſs, the inveſtigation of theſe objects has produced a ſcience that is called MORALITY, to which are connected the doctrines of *natural theology, the law of nature, ethics, politics, &c.* 3. That from their endeavours to inveſtigate the nature of thoſe ſenſible and palſable objects which ſurrounds us, has reſulted a ſcience that is called PHYSICS, or *Natural Philoſophy*; which in like manner conſiſts of ſeveral branches, that all concur to its perfection, ſuch as OPTICS, CHEMISTRY, HYDRAULICS, MECHANICS, and their dependent arts; with many others. 4. That by advancing ſtill further, and by endeavouring to comprehend the nature and properties of ſubjects that are not diſcernible by the ſenſes, but whoſe exiſtence is the reſult of ſpeculation and of a train of reaſoning, a ſcience has ariſen that is called METAPHYSICS; which has alſo many branches, as *ontology, psychology, coſmology, pneumatology, &c.* 5. That from a deſire to know the extention, the figures, the meaſures of all bodies, and their diſtances from each other, &c. they muſt neceſſarily have recourſe to calculation; from whence reſult the *mathematical ſciences*, whoſe principal branches are ARITHMETIC, GEOMETRY, ALGEBRA, ASTRONOMY, &c.

The eſſence of philoſophy in general conſiſts in the inveſtigation of the cauſes of all things; and the grand principle of this inquiry conſiſts in that fundamental maxim, that *no effect is produced without a cauſe*; that *nothing is done without a ſufficient reaſon*. This ſyſtem of the ſufficient reaſon is, therefore, the baſis of all philoſophy, and without it nothing is philoſophical. To conſider the outſide of things, is to know them hiſtorically; to reſolve them, in order to know their principles and their cauſes, is to learn to know them philoſophically; and in this manner even hiſtory may be philoſophically ſtudied. This admirable ſyſtem of the ſufficient reaſon, by diſſuſing the ſpirit of philoſophy in the world, has already purged it of numberleſs dangerous ſuperſtitions: the fables of magicians, forcerers, ſpectres, ghoſts, the abſolute ſympathy, and a thouſand like reveries, have diſappeared from among men of ſenſe, to the very great advantage of the human race.

Philology may be again divided into *ſpeculative*, which includes the ſubjects of metaphyſics, morality, &c. and *demonſtrative or experimental*, which principally regards phyſics; ſeeing that, by the improvement of the human mind by ingenious obſervations and the aſſiſtance of numberleſs admirable inſtruments, modern philoſophers have diſcovered the means of explaining the principal phenomena of nature by experiments, and of demonſtrating their hypotheſes to the ſight and to the touch, which afford proofs much more evident than thoſe of our anceſtors, which were drawn merely from logical inferences.

Natural Philology. See PHYSICS.

Experimental Philology. See EXPERIMENTAL Philology.

Moral Philology. See MORALS.

PHILOSTORGIUS, an eccleſiaſtical hiſtorian of the 4th century, was born in Cappadocia, and wrote an abridgment of eccleſiaſtical hiſtory, in which he treats Athanaſius with ſome ſeverity. This work contains many curious and intereſting particulars. The beſt edition is that of Henry de Valois in Greek and Latin. There is alſo attributed to him a book

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againſt Porphyry.

PHILTER, or PHILTRE, (*Philtrum*), in pharmacy, &c. a ſtrainer.

PHILTRE, is alſo uſed for a drug or preparation, which, it is pretended, will excite love.—The word is formed from the Greek φίλος, “I love,” or φίλος, “lover.”

Philters are diſtinguiſhed into *true* and *ſpurious*. The ſpurious are ſpells or charms, ſuppoſed to have an effect beyond the ordinary laws of nature by ſome magic virtue; ſuch are thoſe ſaid to be given by old women, witches, &c.—The true philters are thoſe ſuppoſed to work their effect by ſome natural and magneſtical power. There are many grave authors, who believe the reality of theſe philters; and allege matter of fact in confirmation of their ſentiments: among the reſt, Van Helmont, who ſays, that upon holding a certain herb in his hand for ſome time, and taking afterwards a little dog by the foot with the ſame hand, the dog followed him wherever he went, and quite deſerted his former maſter; which he pretends to account for thus. The heat communicated to the herb, not coming alone, but animated by the emanations of the natural ſpirits, determines the herb towards the man, and identifies it to him; having then received this ferment, it attracts the ſpirit of the other object magnetically, and gives it an amorous motion.—But this is mere cant; and all philters, whatever facts may be alleged, are mere chimeras.

PHILYCA, in botany. See PHYLYCA.

PHIMOSIS, in medicine, a diſorder of the penis, in which the prepuce is ſo ſtrict or tenſe, that it cannot be drawn back over the glans. See SURGERY.

PHLEBOTOMY, the opening of a vein with a proper ſharp-edged and pointed inſtrument, in order to let out a certain quantity of blood either for the preſervation or recovery of a perſon's health. See SURGERY.

PHLEGM, in the animal economy, one of the four humours whereof the ancients ſuppoſed the blood to be compoſed. The chemiſts make phlegm or water an elementary body, the characters of which are fluidity, inſipidity, and volatility.

PHLEGMAGOGUES, in medicine, a term anciently made uſe of for ſuch medicines as were ſuppoſed to be endowed with the property of purging off phlegm; ſuch as hermodactyls, agaric, turbit, jalap, &c.

PHLEGMATIC, among phyſicians, an appellation given to that habit or temperament of body wherein phlegm is predominant; which gives riſe to catarrhs, coughs, &c.

PHLEGMON, denotes an external inflammation and tumour, attended with a burning heat.

PHLEGON, ſurnamed TRALLIANUS, wrote ſeveral books, very few of which are now extant. He was the emperor Adrian's freed-man. The hiſtory of Adrian publiſhed under Phlegon's name, is thought to have been written by Adrian himſelf. It is ſaid that Phlegon ſpoke of the darkneſs which prevailed during our Lord's paſſion; which has cauſed ſeveral diſputes both among ancients and moderns.

PHLOGISTON, a term uſed by chemiſts to expreſs that inviſible and very much unknown ſubſtance, which, in conjunction with heat or elementary fire,

Philter
Phlogiſton.

Phlogiston. produces the phenomena of flame or ignition, and gives to metals their splendor; which, in other circumstances, contaminates the white colour of some earths and metallic calces, with black, brown, or other shades; and which in some cases renders the air noxious, and incapable of sustaining the life of animals, or supporting flame, &c. &c.

¹ Phlogiston cannot be procured in an uncombined state.

To give a definition of this *principle of inflammability*, as the phlogiston is frequently called, has hitherto been found impossible; because, it is so far from being the subject of investigation by itself, that no person has yet been able to procure it by itself; neither is it possible to expel it from any one body, without suffering it, in the very same moment, to combine with another. In the act of burning, for instance, phlogiston is discharged very copiously by any inflammable body; but some part, and that a very considerable one, goes to the composition of the flame. Part of the remainder is carried off by the air, and goes to the formation of foot; another part contaminates the air, and either converts part of the atmospheric air into what is called *fixable air*, or, according to others, *phlogisticates* it, while the fixable air is separated from the atmosphere itself, of which it is originally a component part: but in all this process, no part of the phlogiston is to be discovered by itself. In like manner, when iron is dissolved in the vitriolic acid, a great quantity of phlogiston is discharged: but in this case also it is altogether invisible, and incapable of being subjected to examination; the only result of this process being a kind of aerial vapour, by Dr Priestley and others called *inflammable air*: and so, in all other phlogistic processes, though we are assured that the principle is discharged in great quantity, yet it constantly eludes our most diligent search.

² Arguments for the identity of elementary fire and phlogiston.

From this invisibility of the phlogiston, it has been concluded, either that phlogiston is the matter of fire, heat, and light, or that these elements contain it in great quantity. The arguments for this opinion seem reducible to the following. 1. Phlogiston is in some cases capable of penetrating the substance of the closest bodies, in such a manner as to be capable of reducing calcined metals to their proper state. 2. The light of the sun appears to contain phlogiston; as it will turn the calx of silver black when exposed to it, even tho' the calx is included within a glass vessel stopped in the most careful manner. In like manner, the green colour which the leaves of plants acquire from the solar light is thought to be owing to a communication of phlogiston from it. 3. Dr Priestley has determined, that the electric fluid either is the phlogiston itself, or contains it; because an electric shock will either reduce metals to a calx, or restore them from a calcined to a metallic state.

³ Insufficient.

In considering these arguments, however, it is obvious, that it ought first to be proved beyond dispute, that the substance of fire, light, or electric fluid, can be fixed in bodies in such a manner as to gravitate, and sensibly increase the weight of such bodies. That phlogiston can do this, seems to be demonstrable from a known fact in the conversion of iron into steel; for in this case, the steel produced always exceeds in weight the iron originally employed. But in no case whatever can we combine the matter of fire or light directly with any substance in such a manner, that we

can say beyond a doubt, that we have made the flame **Phlogiston**, or the light ponderable. The celebrated Mr Boyle made a vast number of experiments upon this subject, and supposed that he had succeeded, because many bodies, such as lead, become heavier from being exposed to the action of fire. But later experiments have discovered, that this increase of weight is owing to an adhesion of air, and not of fire or light, as was commonly thought. Neither can it be at all proved, that the fire or light is in these cases converted into air, as some have imagined. Besides, in the only case in which any thing like pure phlogiston is ever separated by itself, at least as far as we yet know, it is so far from appearing like what we would expect from light or heat, that it is the very reverse; and if there was such a principle in nature as *positive darkness*, the phlogiston would seem to have a much greater affinity to it than to light. The very remarkable experiment to which we now allude is recorded by Dr Priestley † (its author) in the following words.

“A very singular decomposition of inflammable air p. 369. I observed in consequence of exposing a great variety of substances to the influence of a sand-heat, which I kept up for several months. Among other things I buried in this hot sand, glass tubes hermetically sealed, and previously filled with all the different kinds of air. I filled them in the following manner.

“Having provided myself with glass tubes about four feet long, and about one third or one half of an inch in diameter, and of such a thickness that I could easily melt them with the flame of a couple of candles and a common blow-pipe, I first sealed the tubes at one end, then filled them with quicksilver, and placed them inverted in a basin of the same. After this, either transferring the air in a bladder from the jars in which they had been standing in water, or generating the air afresh, if it was of a kind not to bear the contact of water, I filled the tubes completely with the kinds of air on which I wished to make the experiment, displacing the quicksilver. This being done, I inclined the tube, and applying the flame of my candles, with some care, (holding the blow-pipe in my mouth only, and keeping firm hold of the tube on each side of the place to which I was applying the heat,) I melted the glass, and took off what lengths of it I pleased; and every piece was of course hermetically sealed. These pieces I marked with a file, keeping an account of the meaning of the marks, that when I took them out of the sand I might presently know with what kind of air they had been filled.

“When I was performing this part of the process with inflammable air in flint-glass tubes, I observed that the places to which I applied the heat were generally tinged black: but I gave little attention to this circumstance, thinking it might be something accidental; and, without any particular expectation, I buried these tubes in the sand together with the others. This was on the 25th of September 1777.

“On the 20th of January following, I examined these tubes, together with every thing else that had been exposed to the same heat. The tube containing the inflammable air was 10 inches long, and by some accident was broke; but it was jet black throughout. At this I was very much surprised, but I did not then suspect that it was at all owing to the inflammable air with which

⁴ No authentic influence of fire being ponderable.

⁵ Experiments in Natural Philosophy, vol. I.

⁶ Inflammable air decomposed by heat.

Phlogiston. which it had been filled; thinking it might have been occasioned by some phlogiston matter in the sand, or in some of the vessels that had been burst in the neighbourhood. Reflecting, however, on this odd circumstance, and thinking, from the uniformity of the tinge, that possibly it might have been occasioned by the inflammable air, I filled another small glass tube with the same air; and, sealing it hermetically, buried it deep in sand contained in an iron pot, which I set on the fire, and made very hot, nearly red; and taking it out the next day, I found the tube quite black, except a small part on one side of that end which had been uppermost, about two inches higher than the other, and consequently had not been exposed to so great a degree of heat.

"Being now fully satisfied that the blackness of the tube was certainly occasioned by the inflammable air within it, in circumstances in which it could not expand, I proceeded to examine the state of the air. But, in the first place, to assure myself that there had been no communication between that air and the external air by means of some unperceived crack in the glass, I plunged it in water, and, exhausting the air over it, I did not perceive that any bubble escaped. Then, breaking the end of the tube under water, I examined it, and found it not to be inflammable. Sometimes, however, when I have only made the tube just black throughout, by applying the flame of a candle with a blow-pipe to every part of it in succession, the air has still been inflammable.

"Putting two glass tubes, about four inches in length, and a quarter of an inch in diameter, into a sand furnace, I kept them in it two days; when I took them out, and observed, that the tube which I had placed at the bottom of the sand in the greatest degree of heat was nearly melted, and perfectly blue like indigo; while the other tube, which had not been exposed to so great a degree of heat, was of a beautiful jet black throughout.

"Examining the air in these tubes, I found that in the black tube reduced to one third of its bulk, and mere phlogisticated air. It did not make lime-water turbid, was not affected by nitrous air, and was not inflammable. The air in the blue tube, or that which had been exposed to the greatest degree of heat, was reduced to a very small bubble, so that no experiment could be made upon it. I have no doubt, however, that it was phlogisticated.

"At one time I had a suspicion that this blackness communicated to the glass was something precipitated from the iron by the solution of which the inflammable air had been made; but I was soon convinced of the contrary, by finding that the effect was the very same when the inflammable air was made from zinc.

"I soon found that there was no occasion for such a long process to produce this effect, at least upon the glass. For it began to be discoloured the moment it was red-hot, or rather when it became soft; as was evident by holding one of the tubes in an open fire, or in the flame of a candle; for wherever the heat was applied, the blackness took place immediately, without affecting any other part of the tube.

"When I examined this black tinge narrowly, I found that it did not penetrate the glass; but formed a delicate superficial tinge, leaving the glass as perfect-

ly polished as before the process. But the blackness Phlogiston, was indelible: at least it could not be scraped off without tearing the surface of the glass, and it made no change in it with respect to electricity; for the tube thus blackened was as perfect a non-conductor as ever.

"The blue colour of the glass that was most heated, Mr Delaval informed me, was owing to something of iron in the composition of the glass. That it also depended on the degree of heat, I ascertained by placing one of these tubes in a vertical position in the sand-heat. For the lower end of the tube, which had been most heated, acquired a deep blue colour, and it passed into black at the upper end of the tube without any intermediate colour. There was also no other colour higher than the black; so that the first tinge which the glass receives is a perfect black. Yet, viewing the first tinge that it receives by the light of a candle placed beyond it, it seemed to have a shade of red.

"As I was sensible that the blackness was owing to the precipitation of phlogiston from the inflammable air, I thought it possible that some substance which had a near affinity with phlogiston might discharge it; and trying minium, it succeeded immediately. Having filled one of these black tubes with this metallic calx, the moment I made it red hot, the blackness entirely disappeared, and left the tube as transparent as ever it had been.

"In the first experiment of this kind I used minium out of which all its air had been expelled by heat, and which is of a yellow colour. In this process it became whiter, and adhered a little to the glass. When I scraped it off, I could not be quite sure that any part of it had become real lead, but it evidently approached towards a metallic state, by being of a more compact texture than before.

"In this state of the experiments it was suggested by Mr Bewly, that probably the lead in the glass tubes had attracted the phlogiston; and I presently found this to be the case. For when I had filled a green-glass tube with the inflammable air, and sealed it hermetically, as I had done the flint-glass tubes, I exposed it to a melting heat, which is greater than that which flint-glass will bear, without producing any change of colour in it. What remained of air in the tube that did not escape when part of it was melted, was still strongly inflammable.

"It appears, therefore, from this experiment, that the calx of lead, in the form of glass, has a stronger affinity with phlogiston than any thing in the composition of inflammable air, in a degree of heat capable of melting glass. Or, if there be no proper constituent part of inflammable air besides phlogiston, the attraction of the calx is so great as to reduce the phlogiston from an elastic and uncombined state to a fixed and combined one.

"Having by means of these glass tubes effected a complete decomposition of inflammable air, the phlogiston in it having united with the glass of the lead; I thought, that if there had been any acid in its composition, it would then be disengaged, and be found in the tube. In order to find whether there was any acid in it or not, I poured into one of these tubes a small quantity of water made blue with the juice of turnsole; but it came out as blue as it went in."

Phlogiston. From this curious experiment it appears, that phlogiston tends to make bodies opaque even when transparent before; and indeed something of this kind is always observed in whatever manner we apply phlogiston. The calces of lead or tin, made by dissolution and precipitation with the vitriolic acid, though of the purest white, become immediately tinged with black by an union with the smallest particle of phlogiston; or at least their whiteness is so much sullied, that the tendency of phlogiston to produce a black colour is visible on all occasions. Metals also, when combined with phlogiston, are exceedingly opaque; but, when deprived of it, and exposed to a very strong fire, they melt into a transparent glass. Now, if phlogiston was the same thing with fire or light itself, we should be apt to suppose that such bodies as had been longest exposed to the action of fire would contain most of it; but this is not found to be the case. Neither can it

Fire cannot be supposed capable of expelling itself. will be answered, that fire in an active state is capable of expelling fire in a quiescent state; because it must be with this element as with water: succeeding quantities of water, if they are violently urged on, will expel the quantity which lies before them; but at last, a certain quantity will remain in the substance through which the water passed; and this quantity will be the same whether the substance has been immersed in a swift or slow running stream. In like manner, when a substance is exposed to the action even of the most violent fire, that element can only pass through it, as we might suppose water to pass through a sieve, while it remains in the fire; but when it is taken out, and suffered to cool, a certain quantity of the fire must necessarily be supposed to become quiescent, because it has nothing to expel it. It would seem probable, therefore, that if phlogiston was of the same nature with fire, no other change could be made upon bodies by exposing them to the action of that element, than melting, or altering their form; but we evidently see that the fire carries off one part of their substance, and leaves another.

Electric fluid cannot be proved to be phlogiston. Again, with regard to the calcination of metals by the electric fluid, it does not appear to act differently from common fire. An electric spark made to pass between two ends of wires, will deprive them of some part of their phlogiston; but this cannot prove that the electric fluid is the phlogiston of which they are deprived, because in this case they would contain less electric matter than before; but of this we can have no certainty, because all bodies seem to be full of this fluid, and we have no method of measuring the quantity contained in different bodies. As to the reduction of metallic calces by the electric spark, the fact is denied by some eminent foreign philosophers; but although it should be granted, yet we must observe, that a spark of electricity cannot be procured but by making the fluid pass through a small space of air interposed between two ends of wires, or some similar substances. Now though in this case the spark should reduce a metallic calx lying between these two wires, yet this could never prove that the electric fluid itself was phlogiston; because, in passing from one wire and entering the other, a quantity of phlogiston must necessarily be extricated from the wires by the violent impulse of the fluid. We must suspect, therefore, that the electric matter in this case only gives to the calx the phlogiston which it takes from the wires;

or, is it not possible that the phlogistic matter may in part be derived from the air, which always contains a quantity of it?

It hath been observed, that by making the electric spark pass a great number of times through a small quantity of air, the latter becomes diminished and phlogisticated. But in this case also the phlogiston is evidently derived from the metallic points between which the spark must pass. The argument therefore drawn by Dr Priestley from this fact, for the phlogistic nature of the electric fluid, cannot hold. It is the same thing as calcining metals confined in a certain quantity of air by a common fire; for in this case the air is always found to be phlogisticated.

The arguments drawn from the blackening of the calces of silver by the solar beams, seem also to be inconclusive. Glasses, as appears from Dr Priestley's experiment above related, will imbibe phlogiston, and the blackening of calces of silver by the sun-beams. will also part with it, without losing its texture as the glass. Possibly the case may be the same with the calx of silver just now mentioned. The glass, though it appear to us quite clear and transparent, may contain some phlogistic matter, which by the action of the solar light may be transferred to the calx; or it may come from the air contained in the glass. At any rate, it is impossible, from a single experiment, to deduce such an important consequence, especially as it is attended with a singularity which at once overthrows almost every inference we can draw from it. If we suppose the light of the sun to be phlogiston, much more ought we to suppose the light of a common fire to be the same: and if this were the case, then the lunar calx ought to be blackened by exposing it to the light of a common fire as well as to the rays of the sun. But this is found not to be the case; for though we expose the calx of silver to a common fire ever so long, no blackness will take place. It is the same thing with regard to the green colour of plants; for this is produced by the solar light, and by that light only: so that we must own it to be in some respects specifically different from the light of our common fires; but as these differences are totally unknown to us, it is plain, that, until our knowledge in this respect is increased, we cannot argue conclusively concerning the nature either of the one or the other.

In Dr Priestley's treatise on air, he supposes that it is the phlogiston which gives elasticity to that fluid. But in this also that eminent philosopher seems to have been mistaken. It is certain that elasticity is not necessarily connected with phlogiston, since it may be entirely deprived of its elasticity, and fixed in the substance of solid bodies; of which Dr Priestley himself gives a most remarkable instance in the experiment above related of the inflammable air contained in the glass tube. It is impossible that the phlogiston, while in a quiescent inactive state, can either be in a state of expansion, or have a tendency to expand; because this would be supposing it to have two natures diametrically opposite to each other at the same moment. If therefore this substance has some qualities peculiar to its state of quiescence, and others peculiar to its state of expansion, we must of necessity suppose that there is some third substance, by means of which its properties are changed at different times. Now we know, that this third substance is the fire; or rather the fire and

phlogiston. and air combined, for fire alone will not expel phlogiston. If then the fire originally gives its elasticity to phlogiston, it is in the highest degree probable, that to this element it owes its permanent elasticity also.

Some authors have been of opinion, that heat is produced by what they call the *evolution of phlogiston*; and Dr Duguid Leslie, in his treatise on animal-heat, labours throughout a whole chapter to prove, that the evolution of phlogiston is attended with heat. But granting that it is so, if we suppose this evolution to be the cause of heat, we are certainly wrong; for the cause of heat would then be whatever evolves the phlogiston. Dr Leslie supposes that the action of the blood-vessels evolves the phlogiston; and in this case the action of the vessels, not the evolution of phlogiston, is the cause of heat. But in many cases the argument will not hold: for there are numberless instances where phlogiston is evolved in great quantity, without any considerable degree of heat being produced; and in those where the greatest heat is produced, the phlogiston seems not to properly to be evolved, as to be destroyed in such a manner that it can never afterwards be found.

Some philosophers, and among the rest Mr Schele, have supposed, that fire consists in a chemical combination of phlogiston with dephlogisticated air; in which case, says he, the compound becomes so fine and subtle, that it passes through the pores of the most solid bodies, glass itself not excepted. But this supposition is entirely contrary to the analogy of nature. It is certain, that both the air and phlogiston, separately, are incapable of passing through glass; excepting in certain circumstances, where hot glass is found to be penetrable by phlogistic vapours: nor have we any instance of a mixture of two thick liquids producing a thin one. It seems indeed impossible that this could be the case without a change of nature in both fluids; and no substance can change its nature of itself. Certain substances indeed there are, which appear to change their natures by being mixed; but if we consider the matter fairly, we will find that this change is only in appearance. Thus, if powdered cream of tartar is mixed with chalk or quicklime, the mixture appears to deliquesce in the air, which is a property belonging neither to the chalk nor cream of tartar. But here a quantity of alkaline salt is produced, which naturally deliquesces, and occasions the deception. In like manner, when a neutral salt is formed by an acid and alkali, both of which taken separately will deliquesce in the air, yet the nature of these component parts are not changed though the neutral salt does not deliquesce: only their attraction for each other is so strong, that their attraction for water becomes less than that of the air for the same element; and of consequence the salt remains dry. But at any rate, there is no possibility of making a saline solution more fluid than water. Every substance which can be dissolved in water or an aqueous fluid, always takes something from its fluidity; and the same thing happens with oil, or any other fluid thicker than water. It is incredible that two kinds of oil, both of them having a thick consistence when separate, should yet, by simple mixture, become as fluid as water: yet on a similar supposition, which cannot

be explained by any known fact in nature, proceeds Phlogiston. the whole of Mr Schele's hypothesis.

It may indeed be argued, that phlogiston is by itself capable, in some cases, of pervading solid bodies; and consequently may communicate to the common heat atmosphere, by a chemical combination with it, such a degree of fluidity, that it will pass through the pores of glass or any other solid substance. In support of this hypothesis it may be urged, that Dr Lewis * asserts his * *New-Phlogiston* having seen globules of lead revived by the action of *mann's Chemistry* the phlogistic vapours of charcoal, even in the middle of thick pieces of glass, where there was not the least appearance of a crack. It is certain also, that though we deprive mercury of its phlogiston as much as possible by means of the nitrous acid, it will rise in its native form by distillation in the closest vessels.

But in these, and other similar instances, we are to consider, in the first place, that by heat the pores of all bodies are opened, and consequently made liable to receive substances, which in their natural state they would not receive. All fluid substances also have their fluidity increased by heat. Thus, we will find that warm water will pass through a thick cloth in a much more full and copious stream than an equal quantity of cold water will do. Now, when glass is much heated, its properties are remarkably changed. It loses its transparency, and becomes a conductor of electricity; and if it then conducts this fluid, or modification of a fluid, which at other times it cannot do without being shattered to pieces, this evidently shows that it may also conduct, or be penetrable by, vapours of various kinds. This will account in a satisfactory manner for the revival of lead in the heart of solid pieces of glass; for it is not pretended that a reinvigoration of this kind will take place in the cold, even tho' the glass should be exposed to the greatest quantity of phlogistic vapours that can be imagined. Hence the inference must be very strong, not that heat derives any of its activity from phlogiston, but that all the activity which phlogiston possesses is derived from heat.

Again, with respect to the calcination of mercury, why the and its revival by mere heat, it must be remembered, that neither calcinations nor reinvigoration of metals can take place *in vacuo*. Mercury may indeed be revived without a kind of calx by exposure to the fire, but then it must also be exposed to the air at the same time; and indeed the case is the same with all metals. It is probable, therefore, that all of them receive something from the air, and this is abundantly confirmed by experiments; for no calx can be reduced without an emission of air at the time of reduction. The common metals on this occasion emit fixable air; but the calces of mercury emit dephlogisticated air. If the air is dephlogisticated, it is plain that the calx must be phlogisticated; because the air of our atmosphere is not in a pure dephlogisticated state. The phlogiston it contains must therefore be disposed of in some way or other, and it is in the highest degree probable that it remains with the calx. But a phlogisticated calx becomes a metal, when exposed to a proper heat. In the revival of mercury, therefore, the phlogiston probably comes from the air. Silver and gold, which are indestructible by fire, probably owe this quality to their having little attraction for fixed air, but a great deal for phlogiston. The consequence,

Phlogiston. of this must be, that if a calx of silver or gold is exposed to the air and to the action of heat at the same time, the calx will imbibe the phlogiston rather than fixable air; and of consequence will always appear in a metallic state, though it should be calcined ever so long.

27
Enumeration
of the
properties
of phlogis-
ton.

Having thus shewn at some length, that phlogiston cannot with any probability be supposed to have active qualities of its own distinct from those which it receives from the fire, we must next inquire into its nature from the few properties which it is certainly known to possess. These properties may be reduced to the following.

1. It is capable of being reduced to an exceedingly thin, permanently elastic, and light vapour; in which state it has all the properties of a species of air.

2. It may be deprived of this elasticity, and combined with terrestrial bodies; in which case it becomes ponderable, and gives a remarkable degree of opacity to all bodies with which it unites itself.

3. In a great many cases it is a means of producing and preserving flame; especially when combined with terrestrial bodies.

4. In some cases it appears to give a violent explosive power to common air.

5. When combined with air in a certain degree, it deprives it of the very essential properties of supporting flame or animal life.

From a general consideration of these properties, it appears probable that phlogiston is a terrestrial substance, expandible indeed in the highest degree, but which may also be reduced to a solid, and which in that state of solidity seems to be endowed with no other properties than those of passive terrestrial matter, owing all its activity to a combination either with fire or air.

In considering the phlogiston with regard to its property of sustaining flame, we find that the greater quantity of the inflammable principle there is in any substance to be inflamed, the more easily and fiercely it burns; and the same effect follows, if the air is perfectly free from phlogiston, though the inflammable subject should contain a smaller quantity of it. But if we invert this proportion, loading the air with phlogiston, and at the same time giving a great quantity of it to the fuel, the fire will infallibly be extinguished, though made ever so fierce originally.—Now to understand the reason of this, we must call to mind what hath already been delivered in various parts of this work, concerning the nature of electric fluid, heat, vapour, fire, and flame. Under these articles it has been shown,

28
Recapitulation
of the
properties
of heat.

1. That fire, heat, light, and electricity, are only so many different modifications of the same fluid, which we shall here call the *etherial fluid*.

2. That the etherial fluid acting as fire or heat, acts from a centre to the circumference, in every part of the heated body.

3. That the same fluid acting as light, vibrates as from a centre, but that the centre from which it vibrates is at a distance from the body on which the light falls.

4. When a great quantity of light falls upon any body, that is, when the vibrations of the etherial fluid towards it are exceedingly vehement, they pene-

trate its substance, however solid it may be, and a new vibration takes place within the substance of the body itself. The centre from which the vibrations proceed being then within the body, heat is the certain consequence; and therefore every intense light will in a short time produce heat.

5. In certain bodies the etherial fluid may have a vibration, or tendency to vibration, within the substance of the bodies themselves, though by reason of their texture this vibration is not observed externally. In this case the heat is said to be *latent*, and the body is cold to the touch, as is the case of vapour.

6. When this tendency to expand becomes exceedingly great, the particles by which the etherial fluid is confined must yield to its impulse, and the body becomes hot to the touch; or if the impulse is very violent, it breaks out into flame, and burns fiercely.

7. Flame cannot exist without a decomposition of vapour; and this decomposition takes place as soon as more latent heat is forced upon the vapour than it can contain.

8. Vapour will absorb heat to a certain degree; and in proportion to this absorption, it cools those bodies which it touches, or extinguishes fire when blown upon it.

9. Vapour, having absorbed as much heat as it can contain, when blown upon a fire, instead of extinguishing it, is instantly decomposed, and is converted into violent flame, returning back all the heat which it had formerly absorbed.

Under the article *FLAME*, it has also been shown, that probably no vapours whatever are absolutely un-inflammable, though some are set on fire with much more difficulty than others. Those which are easily inflamed we call *inflammable*, and those which cannot be inflamed without a great deal of difficulty are called *uninflammable*. As, therefore, among all this variety of vapours there must be one more inflammable than all the rest, it is very natural, if it is frequently to be met with, to call it the *phlogiston*, or inflammable principle. Now, we find a certain kind of substance so universally diffused throughout nature, that scarce any thing seems to be perfectly divested of it. This substance is oil, and it is universally allowed to contain a great quantity of the phlogiston. But, when we come to analyse the substance of oil itself, we find it composed of an earthy matter which remains in the retort after distillation; and of a fluid, thinner than the oil originally was, which arises in vapour: but if this thin oil be subjected to a second distillation, it again leaves a quantity of fixed matter, and yields a portion of oil still more fluid than before. By a repetition of the process, more earth is still produced, the oil which arises becomes less and less in quantity, till at last it cannot by any means be collected.—Hence it is probable, that oil is composed of earthy particles disposed in such a manner that they are easily fitted for absorbing heat, and thus being converted into vapour; at the same time that they are also very easily capable of being decomposed, and of parting with the heat, after which they resume their original terrestrial form.

From a consideration of all this, we are naturally led to conclude, that the *phlogiston*, properly so called, is only a portion of empyreumatic oil, that is, of oil pyreumatic which oil.

29
Analysis of
oil.

phlogiston, which is partly decomposed by having been exposed to a violent heat.—This hypothesis will solve all the phenomena in which phlogiston is concerned.—Alkalies and calcined earths are found to attract phlogiston powerfully, and so likewise they do the grosser oils.—The vitriolic acid unites with phlogiston, and so will it do with oils of almost every kind.—The nitrous acid unites more powerfully with phlogiston than most other substances; but the same acid will unite with many kinds of oils so violently, as to set them on fire.—Phlogiston stains every thing black which it touches, and so does empyreumatic oil.—Phlogiston, when combined with air, will extinguish flame; but oil will do so likewise, if it is thrown on a fire in too great quantity. The reason for the same in both cases. Oil absorbs fire in great quantity before it can be raised in vapour; and until it can be raised in vapour, it cannot be kindled. After it is reduced to vapour, it still absorbs more before the vapour is converted into flame. If then the phlogiston is poured upon flame while it is in this absorbing state, the undoubted consequence must be, that, instead of adding any thing to its heat, it will take something from it, and if the quantity is sufficiently large, the flame must be extinguished. In like manner, when oil in its liquid state is poured upon fire, it absorbs part of the heat; and if the quantity of oil poured on is capable of absorbing more heat than the fire can give, an extinction of the flame will undoubtedly take place. But if phlogiston is poured upon flame, after having absorbed as much fire as it can contain, it will then, instead of extinguishing, increase the fire to a great degree; because the texture of it is entirely decomposed, and it throws out at once all the fire it had imbibed before. In like manner oil, if heated till just ready to inflame, will burn fiercely if thrown into a fire though in ever so large a quantity. Nay, if oil is violently heated in a vessel over the fire, and that vessel afterwards set down upon the cold and moist ground, the oil will be set on fire. The reason of this is, that the superabundant heat contained in the vessel and lower parts of the oil, is, by the cold, violently forced towards the surface, whence a thick vapour is continually arising. This vapour has already as much latent heat as it can contain; but more being continually forced upon it, in attempting to fly from the cold below, the vapour is entirely decomposed, and throws out not only that quantity which the cold forces upon it, but all that the oil had imbibed while it continued over the fire.

Hence we may account for the generation and phenomena of inflammable air. This is produced in the first place by acids, in the second place by the distillation of inflammable substances by a strong fire, and in the third place by the vapour of vitriolic ether.

1. When the vitriolic acid is poured upon filings of iron, a vapour arises, which is not only capable of inflammation by itself, but explodes with violence when mixed with common air, upon the contact of flame. Here we must consider, that the vitriolic acid contains a great deal of latent heat, as is evident from mixing it with water, when the mixture grows very hot, and shrinks in bulk. This will likewise happen when the diluted acid is poured upon iron filings; for then the mixture again grows hot, which shows an

extrication of heat formerly latent somewhere. Along with this heat, the phlogiston of the metal is discharged, and of consequence the latter absorbs as much fire as it conveniently can. The union is here perfectly complete: for as it is made beneath the surface of an aqueous fluid with which the phlogiston has but little tendency to unite, (for oil and water do not readily mix with one another), the inflammable principle absorbs just as much of the fire as it can contain; the superfluous quantity being dissipated in the air. It then remains an invisible, elastic, and very light vapour; because the greatest part of its composition is pure fire, which never could be proved to have any weight; and therefore inflammable air is much lighter than common air, which always has a considerable quantity of water in its composition.—This being the case, it is plain, that when any flaming body is immersed in this vapour, that part of the vapour which touches the flame must be kindled, and the phlogiston, being emptied of the greatest part of the fire it contained, will now combine with the common air, and phlogisticate it; that is, it will combine, loosely with it, and, not having so much fire as it could contain, will greedily attract more from every ignited substance which comes in its way, and will therefore extinguish fire as far as its operation goes.

It remains only now to shew the reason of the explosion of inflammable air when mixed with common air; and this most probably arises from the extreme inflammability of the phlogistic vapour when fully saturated with heat. By this means almost every part of it takes fire at the same instant; and thus a considerable quantity of air being violently heated at the same moment, must expand in proportion, and a considerable explosion take place. When dephlogisticated air is mixed with inflammable air, the explosion is much greater; and the reason is plain, because in common air there is always a quantity of phlogistic vapour not saturated with heat. This vapour absorbs a quantity of the heat thrown out by the decomposed inflammable air; and consequently lessens that which is communicated to the common air, and on which the explosion depends. But in the dephlogisticated air, as little or no vapour of this kind exists, the heat which the inflammable air throws out is almost all communicated to the former, and therefore the explosion is much greater; especially as dephlogisticated air increases the power of any kind of flame to such a degree, that by its means the heat of common fire is made equal to that of a burning mirror.

2. When inflammable air is produced from a distillation of wood or any other kind of inflammable substance, it is emitted at the time that the oil comes over: and therefore we may justly conclude, that it is nothing else than a part of the vapour of that oil which has imbibed so much fire, and is become so intimately combined with it that it cannot be condensed without an entire decomposition; for this is the case with inflammable vapours when they have got a certain quantity of this fluid in them. Thus, the gross vapour is raised by the fire, but is not thoroughly penetrated by it. The fire indeed expands it till it becomes lighter than the common atmosphere. It is hot to the touch, and therefore its heat is ready to be absorbed by every cold substance which.

Phlogiston, which it touches; of consequence the vapour condenses without inflammation: but when the fire has entered into a more close combination with it, so that the expansive force of that element is totally confined by the particles of the oil, the vapour is then cold to the touch, yet so full of *internal* or *latent* heat, that it is ready to take fire on the slightest contact of a burning body. The vapour is then inflammable and incombustible; and, being perfectly transparent and invisible, is called *inflammable air*.

3. The production of inflammable air from vitriolic ether is so easily accounted for after what has been said, that little further notice needs be taken of it: only it may be observed, that the vapour of ether itself, even when in its condensible state, will explode when mixed with common air; which seems to show very clearly, that we are not to look upon inflammable air, when incombustible and perfectly invisible, as any other thing than an exceedingly subtle vapour or thin smoke, and consequently that the *phlogiston* itself is only the oily particles which constitute that vapour.

23
Diminution
of air by
phlogiston
explained.

We must now inquire into that remarkable property of *phlogiston* by which it always diminishes air when mixed with it. In order to understand this, it will be necessary to consider by what means the bulk of air is diminished. This, if we except mechanical compression, can only be done by taking away either part of its elasticity, or some of its other component parts. Now, it hath been shown under the article *FLUIDITY*, that all fluids contain a great quantity of latent heat; nay, that on this principle their fluidity entirely depends. Of consequence, the air must contain a great quantity of latent heat; and if any substance capable of absorbing this heat is presented to it, the air must be diminished. This is the case with *phlogiston*; and therefore air is always found to be diminished in consequence of being *phlogisticated*. But in proportion as the air loses this heat, and the *phlogiston* imbibes it, it is plain that the latter must become more and more saturated with it, and of consequence approach nearer and nearer to an inflammable state. Hence we may account for the change of nitrous into inflammable air, mentioned by Dr Priestley. But for a more full discussion of all these subjects, see the articles *INFLAMMABLE Air*, *NITROUS Air*, &c. in the APPENDIX.

Before concluding this article, however, it will be proper to take notice of some objections which may be brought against the theory above laid down.

1. It is impossible, say the objectors, to prove that there is in nature any substance which properly deserves the name of *phlogiston*, or sole principle of inflammability. We see that bodies are capable of being set on fire; but before we assume the existence of such a principle as *phlogiston* in the abstract, we ought to be able at least to define it, that so we might be able to prove its existence in different bodies. - But, as matters stand at present, it is impossible for us even to know when we have gained our point. How is it possible, for instance, to know whether the *phlogiston* in spirit of wine be exactly the same with that in sulphur? Or, by what means can we be ascertained that it is the same principle which gives the splendor to metals that causes bodies emit a flame?

To this it may be replied, that philosophers in general have attributed all these phenomena to one

cause: therefore every inquirer ought to search among the natural causes, in order to find one which is capable of producing all these phenomena; and if he finds such an one, there is the highest probability that there is no other; for nature doth not multiply causes where one will serve. Hence it is incumbent on those who would assume two principles of inflammability, to prove the existence of them both; but there is not the same obligation upon those who assume the existence only of one to prove that no more exist.

2. Though bodies may be inflamed, and have a predisposition to be inflamed in certain circumstances, we are not therefore bound to suppose that this predisposition consists in the admixture of any material substance with them.

Here we must attend to the consequence of inflammation, which is a separation of the body into matter of two different kinds; one of which remains, while the other is carried off. As soon as this volatile matter is entirely dissipated, the inflammation ceases. The probability therefore is exceedingly strong, that this matter either is the principle of inflammability itself, or contains it.

PHLOGONIAE, a class of compound, inflammable, and metallic fossils, found in small masses of determinately angular figures; comprehending the pyricubia, pyroctogonia, and pyripolygonia.

PHLOMIS, the *SAGE-TREE*, or *Jerusalem Sage*; a genus of the gymnospermia order, belonging to the didynamia class of plants. There are 14 species, all of which have perennial roots, and of many the stalks also are perennial. The latter rise from two to five or six feet high; and are adorned with yellow, blue, or purple flowers in whorls. They are all ornamental plants; and deserve a place in gardens, as they are sufficiently hardy to endure the ordinary winters in this climate: they require, however, a pretty warm situation. They may be propagated by offsets, or cuttings.

PHLOX, *LYCHNIDEA*, or *Bastard Lychnis*; a genus of the monogynia order, belonging to the pentandria class of plants. There are seven species, all of them natives of North America. They have perennial roots, from which arise herbaceous stalks from nine inches to two feet in height, adorned with tubulated flowers of a purple colour. They are propagated by offsets, and will bear the winters in this country. They require a moist rich soil, in which they thrive better and grow taller than in any other.

PHLYCTENÆ, in medicine, small eruptions on the skin.

PHOCA, in zoology, a genus of quadrupeds of the order of feræ. There are six parallel foreteeth in the upper jaw, the outermost being larger; and four blunt, parallel, distinct, equal fore-teeth in the under jaw. There is but one dog-tooth, and five or six three-pointed grinders; and the hind feet are united so as to resemble a ship's tail. There are three species, viz.

1. The *urina*, or sea-bear, has external ears. The male is greatly superior in size to the female. The bodies of each are of a conic form, very thick before, and taper to the tail. The length of a large one is eight feet; the greatest circumference, five feet; near the tail, 20 inches; and the weight is about 800 lb. The nose projects like that of a pug-dog, but the head

rides

24
Phlogiston
in the
abstract.

rises suddenly; the teeth lock into one another when the mouth is shut; the tongue is large; the eyes are large and prominent, and may be covered at pleasure by a fleshy membrane. The length of the fore-legs is 24 inches; they are like those of other quadrupeds, not immersed in the body like those of seals; the feet are formed with toes like those of other animals, but are covered with a naked skin, so that externally they seem to be a shapeless mass; the hind-legs are fixed to the body quite behind, like those of seals; but are capable of being brought forward, so that the animal makes use of them to scratch its head.

These animals are found in the northern seas. During the three months of summer they lead a most indolent life: they arrive at the islands vastly fat; but during that time they are scarce ever in motion, confine themselves for whole weeks to one spot, sleep a great part of the time, eat nothing, and, except the employment the females have in suckling their young, are totally inactive. They live in families: each male has from 8 to 50 females, whom he guards with the jealousy of an eastern monarch; and though they lie by thousands on the shores, each family keeps itself separate from the rest, and sometimes, with the young and unmarried ones, amount to 120. The old animals, which are destitute of females, or deserted by them, live apart, and are excessively spleenitic, peevish, and quarrelsome: are exceeding fierce, and so attached to their old haunts, that they would die sooner than quit them. They are monstrously fat, and have a most hir-cine smell. If another approaches their station, they are roused from their indolence, and instantly snap at it, and a battle ensues; in the conflict, they perhaps intrude on the seat of another: this gives new cause of offence, so in the end the discord becomes universal, and is spread through the whole shore.

The other males are also very irascible: the causes of their disputes are generally these. The first and most terrible is, when an attempt is made by another to seduce one of their mistresses or a young female of the family. This insult produces a combat; and the conqueror is immediately followed by the whole seraglio, who are sure of deserting the unhappy vanquished. The second reason of a quarrel is, when one invades the seat of another: the third arises from their interfering in the disputes of others. These battles are very violent; the wounds they receive are very deep, and resemble the cuts of a sabre. At the end of a fight they fling themselves into the sea, to wash away the blood.

The males are very fond of their young, but very tyrannical towards the females: if any body attempts to take their cub, the male stands on the defensive, while the female makes off with the young in her mouth; should she drop it, the former instantly quits his enemy, falls on her, and beats her against the stones, till he leaves her for dead. As soon as she recovers, she comes in the most suppliant manner to the male, crawls to his feet, and washes them with her tears: he, in the mean time, stalks about in the most insulting manner; but in case the young one is carried off, he melts into the deepest affliction, and shews all signs of extreme concern. It is probable that he feels his misfortunes the more sensibly, as the female ge-

nerally brings but one at a time, never more than two.

They swim very swiftly, at the rate of seven miles an hour. If wounded, they will seize on the boat, and carry it along with vast impetuosity, and oftentimes sink it. They can continue a long time under water. When they want to climb the rocks, they fasten with the fore-paws, and so draw themselves up. They are very tenacious of life, and will live for a fortnight after receiving such wounds as would immediately destroy any other animal.

2. The *leonina*, or sea-lion, is found near the south pole. One variety of this species is described at some length by the publisher of Anson's voyage. However, according to others who have written on this subject, the name of *sea-lion* belongs not so properly to this as to another, which has a mane like a true lion. Of these we have the following account from Perney's Historical Journal. "The hair that covers the back part of the head, neck, and shoulders, is at least as long as the hair of a goat. It gives this amphibious animal an air of resemblance to the common lion of the forest, excepting the difference of size. The sea-lions of the kind I speak of, are 25 feet in length, and from 19 to 20 in their greatest circumference. In other respects they resemble the sea-lions. Those of the small kind have a head resembling a mastiff's, with close cropt ears.

"The teeth of the sea-lions which have manes, are much larger and more solid than those of the rest. In these, all the teeth which are inserted into the jaw-bone are hollow. They have only four large ones, two in the lower and two in the upper jaw. The rest are not even so large as those of a horse. I brought home one belonging to the true sea-lion, which is at least three inches in diameter, and seven in length, though not one of the largest. We counted 22 of the same sort in the jaw-bone of one of these lions, where five or six were wanting. They were entirely solid, and projected scarce more than an inch or an inch and a half beyond their sockets. They are nearly equal in solidity to flint, and are of a dazzling white. Several of our seamen took them for white flints when they found them upon the shore. I could not even persuade them that they were not real flints, except by rubbing them against each other, or breaking some pieces off, to make them sensible that they exhaled the same smell as bones and ivory do when they are rubbed or scraped.

"These sea-lions that have manes, are not more mischievous or formidable than the others. They are equally unwieldy and heavy in their motions; and are rather disposed to avoid than to fall upon those who attack them. Both kinds live upon fish and water-fowl, which they catch by surprise. They bring forth and suckle their young ones among the corn-flags, where they retire at night, and continue to give them suck till they are large enough to go to sea. In the evening you see them assembling in herds upon the shore, and calling their dams in cries so much like lambs, calves, and goats, that, unless apprised of it, you would easily be deceived. The tongue of these animals is very good eating: we preferred it to that of an ox or calf. For a trial we cut off the tip

of the tongue hanging out of the mouth of one of these lions which was just killed. About 16 or 18 of us eat each a pretty large piece, and we all thought it so good, that we regretted we could not cut more of it.

"It is said that their flesh is not absolutely disagreeable. I have not tasted it: but the oil which is extracted from their grease is of great use. This oil is extracted two ways; either by cutting the fat in pieces, and melting it in large cauldrons upon the fire; or by cutting it in the same manner upon hurdles, or pieces of board, and exposing them to the sun, or only to the air: this grease dissolves of itself, and runs into vessels placed underneath to receive it. Some of our seamen pretended, that this last sort of oil, when it is fresh, is very good for kitchen uses: this, as well as the other, is commonly used for dressing leather for vessels, and for lamps. It is preferred to that of the whale: it is always clear, and leaves no sediment.

"The skins of the sea-lions are used chiefly in making portmanteaus, and in covering trunks. When they are tanned, they have a grain almost like Morocco. They are not so fine, but are less liable to tear, and keep fresh a longer time. They make good floors and boots, which, when well seasoned, are water-proof.

"One day Mr Guyot and some others brought on board five sea-lionesses. They were about seven feet long, and three and a half in circumference, tho' their intestines were drawn. These gentlemen had landed on a small island, where they found a prodigious number of these animals, and killed eight or nine hundred of them with sticks. No other weapon is necessary on these occasions. A single blow with a bludgeon, three feet or three feet and a half long, almost full at the nose of these animals, knocks them down, and kills them on the spot.

"This is not altogether the case with the sea-lions: their size is prodigious. Our gentlemen encountered two of them for a long time, with the same weapons, without being able to overcome them. They lodged three balls in the throat of one while he opened his mouth to defend himself, and three musket-shot in his body. The blood gushed from his wounds like wine from a tap. However, he crawled into the water and disappeared. A sailor attacked the other, and engaged him for a long time, striking him on the head with a bludgeon, without being able to knock him down: the sailor fell down very near his antagonist, but had the dexterity to recover himself at the instant the lion was going to gorge him. Had he once seized him, the man would infallibly have been lost: the animal would have carried him into the water as they usually do their prey, and there feasted upon him. In his retreat to the sea this animal seized a penguin, and devoured him instantaneously."

3. The vitulina, sea-calf, or common seal, inhabits the European ocean. It has a smooth head without external ears. The common length of those taken on the British coasts is from five to six feet. The fore-legs are deeply immersed in the skin of the body: the hind-legs are placed in such a manner as to point directly backwards: every foot is divided into five toes; and each of those connected by a strong and broad web, covered on both sides with short hair. The toes

are furnished with strong claws, well adapted to assist the animal in climbing the rocks it basks on: the claws on the hind feet are slender, and straight; except at the ends, which are a little incurvated. The head and nose are broad and flat, like those of the otter; the neck short and thick; the eyes large and black; in lieu of external ears, it has two small orifices: the nostrils are oblong: on each side the nose are several long stiff hairs; and above each eye, are a few of the same kind. The form of the tongue is so singular, that were other notes wanting, that alone would distinguish it from all other quadrupeds; being forked, or slit at the end. The cutting teeth are singular in respect to their number, being six in the upper jaw, and only four in the lower. It has two canine teeth above and below, and on each side of the jaw five grinders; the total 34. The whole animal is covered with short hair, very closely set together: the colour of that on the body is generally dusky, spotted irregularly with white; on the belly, white: but bears very greatly in their marks and colours, and some have been found entirely white.

The seal is common on most of the rocky shores of Great Britain and Ireland, especially on the northern coasts: in Wales, it frequents the coasts of Caernarvonshire and Anglesey. It preys entirely on fish, and never molests the sea-fowl: for numbers of each are often seen floating on the waves, as if in company. Seals eat their prey beneath the water; and in case they are devouring any very oily fish, the place is known by a certain smoothness of the waves immediately above. The power of oil in stilling the waves excited by a storm, is mentioned by Pliny: the moderns have made the experiment with success; and thereby made one advance towards eradicating the vulgar prejudices against that great and elegant writer.

Seals are excellent swimmers, and ready divers; and are very bold when in the sea, swimming carelessly enough about boats: their dens or lodgments are in hollow rocks, or caverns, near the sea, but out of the reach of the tide: in the summer they will come out of the water, to bask or sleep in the sun, on the top of large stones or shivers of rocks; and that is the opportunity our countrymen take of shooting them: if they chance to escape, they hasten towards their proper element, flinging stones and dirt behind them, as they scramble along; at the same time expressing their fears by piteous moans; but if they happen to be overtaken, they will make a vigorous defence with their feet and teeth till they are killed. They are taken for the sake of their skins, and for the oil their fat yields: the former sell for 4s. or 4s. 6d. a-piece; which, when dressed, are very useful in covering trunks, making waistcoats, shot-pouches, and several other conveniences.

The flesh of these animals, and even of porpoises, formerly found a place at the tables of the great; as appears from the bill of fare of that vast feast that archbishop Nevill gave in the reign of Edward IV. in which is seen that several were provided on the occasion. They couple about April, on large rocks, or small islands, not remote from the shore; and bring forth in those vast caverns that are frequent on our coasts; they commonly bring two at a time, which in their infant state are covered with a whitish down, or woolly substance

Phoca. **stance.** The seal-hunters in Caithness say, that their growth is so sudden, that in nine tides from their birth (54 hours) they will become as active as their parents. On the coast of that country are immense caverns opening into the sea, and running some hundreds of yards beneath the land. These are the resort of seals in the breeding time, where they continue till their young are old enough to go to sea, which is in about six or seven weeks. The first of these caves is near the Ord, the last near Thrumfrier; their entrance is so narrow, as only to admit a boat; their inside very spacious and lofty. In the month of October, or the beginning of November, the seal-hunters enter the mouths of the caverns about midnight, and rowing up as far as they can, they land; each of them being provided with a bludgeon, and properly stationed, light their torches, and make a great noise, which brings down the seals from the farther end in a confused body with fearful shrieks and cries: at first the men are obliged to give way for fear of being overborne; but when the first crowd is past, they kill as many as straggle behind, chiefly the young, by striking them on the nose; a very slight blow on that part dispatches them. When the work is over, they drag the seals to the boat, which two men are left to guard. This is a most hazardous employ; for should their torches go out, or the wind blow hard from sea during their continuance in the cave, their lives are lost. The young seals of six weeks age, yield more oil than their emaciated dams: above eight gallons have been got from a single whelp, which sells from 6 d. to 9 d. per gallon; the skins from 6 d. to 12 d. each.

Pennant's
British
Zoology.

The natural history of this animal may be further elucidated, by the following extracts from a letter of the reverend Dr William Borlase, dated October the 24th, 1763. "The seals are seen in the greatest plenty on the shores of Cornwall, in the months of May, June, and July. They are of different sizes; some as large as a cow, and from that downwards to a small calf. They feed on most sorts of fish which they can master; and are seen searching for their prey near shore, where the whistling fish, wraws, and pollacks, resort. They are very swift in their proper depth of water, dive like a shot, and in a trice rise at 50 yards distance; so that weaker fishes cannot avoid their tyranny, except in shallow water. A person of the parish of Sennan, saw not long since a seal in pursuit of a mullet (that strong and swift fish): the seal turned it to and fro in deep water, as a greyhound does a hare: the mullet at last found it had no way to escape, but by running into shoal water: the seal pursued; and the former, to get more surely out of danger, threw itself on its side, by which means it darted into shoal water than it could have swum in with the depth of its paunch and fins, and so escaped. The seal brings her young about the beginning of autumn; our fishermen have seen two sucking their dam at the same time, as she stood in the sea in a perpendicular position. Their lead in swimming is always above water, more so than that of a dog. They sleep on rocks surrounded by the sea, or on the less accessible parts of our cliffs left dry by the ebb of the tide; and if disturbed by any thing, take care to tumble over the rocks into the sea. They are extremely watchful, and never sleep long without moving; seldom longer than a minute; then raise their

heads, and if they hear or see nothing more than ordinary, lie down again, and so on, raising their heads a little and reclining them alternately in about a minute's time. Nature seems to have given them this precaution, as being unprovided with auricles or external ears; and consequently not hearing very quick, nor from any great distance."

PHOCÆA, the last lown of Ionia, (Mela, Pliny); of *Æolis*, (Ptolemy), because situated on the right or north side of the river Hermus, which he makes the boundary of *Æolis* to the south. It stood far in the land, on a bay or arm of the sea; had two very safe harbours, the one called *Lampter*, the other *Naustathmos*, (Livy). It was a colony of Ionians, situated in the territory of *Æolis*, (Herodotus). *Maffilia* in Gaul was again a colony from it. *Phocaenſes*, the people, (Livy); *Phocaicus*, the epithet, (Lucan); applied to *Marſeilles*. It was one of the 12 cities which assembled in the panionium, or general council of Ionia.

PHOCION, an Athenian general, and a great orator. Demosthenes himself was afraid of his eloquence. Philip of Macedon had so great an esteem of his courage and military conduct, that he dreaded him. He had as much moderation as Demosthenes had vehemence; and by his prudent counsels diverted Alexander from a war with the Athenians and with all Greece. Alexander sent him presents, and told him he was the only person in Athens whom he acknowledged to be an honest man: Phocion at the same time was drawing water out of the well, and his wife was making of bread; yet he wisely refused the presents. Antipater also offered him great sums of money, which he likewise returned: his innocence and virtue rendered his poverty honourable. He was obliged to take up arms in defence of his country; and his conduct was successful against Philip of Macedon, and upon several other occasions. He was at last condemned on a false accusation of treason by his ungrateful fellow-citizens, and put to death 318 B.C. After which the Athenians erected him a statue, and cut off his accuser.

PHOCIS, (Demosthenes, Strabo, Pausanias); a country of Greece, contained between *Bœotia* to the east, and *Locris* to the west, but extending formerly from the *Sinus Corinthiacus* on the south, to the sea of *Eubœa* on the north, and, according to *Dionysius*, as far as *Thermopylæ*; but reduced afterwards to narrower bounds. *Phocaenſes* the people; *Phocicus*, the epithet, (Justin); *Bellum Phocicum*, the sacred war which the Thebans and Philip of Macedon carried on against them for plundering the temple at Delphi; and by which Philip paved the way to the sovereignty of all Greece, (Justin.)

PHOEBUS, one of the names given by ancient mythologists to the Sun, Sol, or Apollo. See **APOLLO**.

PHOENICIA, or more properly **PHOENICE**, the ancient name of a country lying between the 34th and 36th degrees of north latitude; bounded by Syria on the north and east, by Judæa on the south, and by the Mediterranean on the west. Of its name there are various derivations given. Some derive it from a chief named *Phœnis*: others from the Greek word *Phœnix*, signifying a palm or date; as if that tree had abounded remarkably in this country. According to Bochart, its

Phœnis
||
Phœnicia.

Phœnicia. its most probable etymology is *Phœne Anak*, that is, "the descendants of Anak."

Phœnicia.

It is universally allowed, that the *Phœnicians* were descendants of the *Canaanites*. Their country, however, small as it was, comprehended several kingdoms, viz. *Sidon*, *Tyre*, *Aradus*, and *Byblus*. Of none of these we have any certain history excepting *Tyre* and *Sidon*, which is given under these articles in the order of the alphabet. But their language and religion were diffused over several nations who proceeded from them as colonies, particularly the *Carthaginians*, and are therefore better known.

The language of the *Phœnicians* was little different from that of the ancient *Canaanites*, and consequently a dialect of the *Hebrew*. Their characters were either the very same with the *Samaritan*, or but little different from them. The same may be said of the language of the *Carthaginians*, who, being a *Phœnician* colony, must originally have spoken the same with that of the mother-country. However, it is probable that in after-ages it differed considerably. This indeed has been fully proved by *Selden*, *Scaliger*, *Pitt*, and *Böchart*, the last of whom has collected a number of *Punic* words, and traced all of them up to the *Hebrew* or *Phœnician*. A few of these words are given in the following table.

Hebrew or Phœnician.	Punic.
Zachæus	Sichæus.
Amalec	Amilco, or Himilco.
Hinnon, or Hanun	Hanno.
Hannabaal, or Baal-Hanan	Hannibal.
Ezra, or Ezdras-Baal	Akdrubal.
Barac	Barca.
Mago	Mago.
Adar, or Ader-baal	Adherbal.
Mehir, or Maher-baal	Mahebal.

According to *Prifcian* and *St Askin*, the *Punic* or *Carthaginian* language had an admixture of the *Chaldee* and *Syriac*; and *Salmafius* intimates, that, according to some, the *Punic* language agreed in many respects with the *Egyptian*. *Nay*, *M. Maius*, professor of the *Greek* and *Oriental* languages in the *Ludovician University* of *Giessen*, published a small piece in the year 1718, wherein he shows, that the language of the modern *Maltese* has a great deal of the old *Punic* in it, and that these words are farther distant from the *Arabic* than from the ancient *Hebrew* or *Chaldee*.

With regard to religion, the *Phœnicians* were the most gross and abominable idolaters. The *Baal-berith*, *Baalzebub*, *Baalshamen*, &c. mentioned in *Scripture* were some of the *Phœnician* gods; as were also the *Moloch*, *Ahtaroth*, and *Thammuz*, mentioned in the sacred writings.—The word *Baal*, in itself an appellative, was no doubt applied to the true God, until he rejected it on account of its being too much profaned by the idolaters. The name was not appropriated to any particularly deity among the idolatrous nations, but was common to many; however, it was generally imagined that one great God presided over all the rest. Among the *Phœnicians* this deity was named *Baalshamen*, whom the *Hebrews* would have called *Baalshemin*, or the God of heaven. In all probability this was also the principal *Carthaginian* deity, though his *Punic* name is unknown. We have many religious rites of

the *Carthaginians* handed down to us by the *Greek* and *Roman* writers; but they all bestowed names of their own gods upon those of the *Carthaginians*, which leads us to a knowledge of the correspondence between the characters of the *Phœnician* and *European* deities. The principal deity of *Carthage*, according to *Diodorus Siculus*, was *Chronus* or *Saturn*. The sacrifices offered up to him were children of the best families. Our author also tells us, that the *Carthaginians* had a brazen statue or colossus of this god, the hands of which were extended in act to receive, and bent downwards in such a manner, that the child laid thereon immediately fell down into a hollow where there was a fiery furnace. He adds also, that this inhuman practice seemed to confirm a tradition handed down to the *Greeks* from very early antiquity, viz. that *Saturn* devoured his own children.

The goddess *Cœlestis*, or *Urania*, was held in the highest veneration by the *Carthaginians*. She is thought to have been the same with the queen of heaven mentioned in *Jeremiah*, the *Juno Olympia* of the *Greeks*. According to *Helychius* the same word applied in the *Punic* language both to *Juno* and *Venus*. *Nay*, the ancient *Greeks* frequently confound *Juno*, *Venus*, and *Diana* or the moon, all together; which is to be attributed to the *Egyptians* and *Phœnicians*, from whom they received their system of religion; who seem in the most ancient times to have had but one name for them all. Besides these there were several other deities of later date, who were worshipped among the *Phœnicians*, particularly those of *Tyre*, and consequently among the *Carthaginians* also. These were *Jupiter*, *Apollo*, *Mars*, and *Bacchus*. *Jupiter* was worshipped under the name of *Belus* or *Baal*. To him they addressed their oaths, and placed him for the most part, as there is reason to believe, at the head of their treaties. The same name was also given to the other two, whence they were frequently mistaken for one another. *Apollo* or the sun went either by this name simply, or by others of which this made a part.

The *Carthaginian* superstition, however, was not confined to these deities alone. They worshipped also the fire, air, and other elements; and had gods of rivers, meads, &c. *Nay*, they paid divine honours to the spirits of their heroes, and even to men and women themselves while yet in life; and in this adoration *Hannibal* the Great had for some time a share, notwithstanding the infamous conduct of his countrymen towards him at last. In order to worship these gods with more convenience on all occasions, the *Carthaginians* had a kind of portable temples. These were only covered chariots, in which were some small images representing their favourite deities; and which were drawn by oxen. They were also a kind of oracle, and their responses were understood by the motion impressed upon the vehicle. This was likewise an *Egyptian* or *Libyan* custom, and *Tacitus* informs us that the ancient *Germans* had something of the same kind. The tabernacle of *Moloch* is thought to have been a machine of this kind, and it is not improbable that the whole was derived from the tabernacle of the *Jews* in the wilderness.

Besides all the deities abovementioned, we still find another, named the *Dæmon* or *Genius* of *Carthage*, mentioned

mentioned in the treaty made by Philip of Macedon and Hannibal. What this deity might be, we know not; however, it may be observed, that the pagan world in general believed in the existence of demons, or intelligences who had a kind of middle nature between gods and men, and to whom the administration of the world was in a great measure committed. Hence it is no wonder that they should have received religious honours. For when once mankind were possessed with the opinion that they were the ministers of the gods, and trusted with the dispensation of their favours, as well as the infliction of their punishments, it is natural to suppose that they would be desirous of making their addresses to them.

PHOENICOPTERUS, or **FLAMINGO**, in ornithology, a genus of birds belonging to the order of grallæ. The beak is naked, toothed, and bent as if it was broken; and the nostrils are linear; the feet are palmated, and four-toed. There is but one species; viz. the Bahamensis of Catesby, a native of Africa and America.

This bird resembles the heron in shape, excepting the bill, which is of a very singular form. It is two years old before it arrives at its perfect colour; and then it is entirely red, excepting the quill-feathers, which are black. A full-grown one is of equal weight with a wild duck; and when it stands erect, it is five feet high. The feet are webbed. The flesh is delicate; and most resembles that of a partridge in taste. The tongue, above any other part, was in the highest esteem with the luxurious Romans. These birds make their nests on hillocks in shallow water; on which they sit with their legs extended down, like a man sitting on a stool. They breed on the coasts of Cuba, and the Bahama islands in the West Indies; and frequent salt-water only. By reason of the particular shape of its bill, this bird, in eating, twists its neck from side to side, and makes the upper mandible touch the ground. These birds are very stupid, and will not rise at the report of a gun; nor is it any warning to those who survive, that they see others killed by their side; so that, by keeping himself out of a sight, a fowler may kill as many as he pleases.

PHOENIX, in astronomy. See there, n° 206.

PHOENIX, the *Great Palm*; or *Date-tree*; a genus of plants belonging to the order of palmæ. There is only one species, viz. the *dactylifera*, or common date-tree, a native of Africa and the eastern countries, where it grows to 50, 60, and 100 feet high. The trunk is round, upright, and studded with protuberances, which are the vestiges of the decayed leaves. From the top issues forth a cluster of leaves or branches eight or nine feet long, extending all round like an umbrella, and bending a little towards the earth. The bottom part produces a number of stalks like those of the middle, but seldom shooting so high as four or five feet. These stalks, says Adanson, diffuse the tree very considerably; so that, wherever it naturally grows in forests, it is extremely difficult to open a passage through its prickly leaves. The flowers are male and female upon different roots. The dates, which are the produce of the female plant, grow in large spiral clusters, each being about the bigness and shape of a middling olive, and containing within the pulp, which is of a yellow colour and agreeable taste, a round, strong, hard nut

or stone, of an ash-colour, marked with a deep furrow, running lengthwise. Of the fresh dates and sugar, says Hasselquist, the Egyptians make a conferve, which has a very pleasant taste. The kernels or stones, though hard as horn, they grind in hand-mills, and, in default of better food, give to their camels. Of the leaves are made baskets, or bags, which are much used in Turkey on journeys, and for other economical uses. In Egypt they are used as fly-flaps, for driving away the numerous insects which prove so troublesome in hot countries; and Rauwolf relates, that of the fibres of the leaves and covering of the fruit are spun ropes, of pretty large dimensions and considerable strength. The hard boughs are used for fences and other purposes of husbandry; the principal item for building; in fine, no part of this curious tree wants its use. The fruit, before it is ripe, is somewhat astringent; but when thoroughly mature, is of the nature of the fig. The Senegal dates are shorter than those of Egypt, but much thicker in the pulp, which is said to have a sugary agreeable taste, superior to that of the best dates of the Levant.

These plants may be easily produced from the seeds taken out of the fruit, (provided they are fresh), which should be sown in pots filled with light rich earth, and plunged into a moderate hot-bed of tanners bark, which should be kept in a moderate temperature of heat, and the earth frequently refreshed with water. When the plants are come up to a proper size, they should be each planted into a separate small pot, filled with the same light earth, and plunged into a hot-bed again, observing to refresh them with water, as also to let them have air in proportion to the warmth of the season and the bed in which they are placed. During the summer-time they should remain in the same hot-bed; but in the beginning of August, you should let them have a great share of air to harden them against the approach of winter; for if they are too much forced, they will be so tender as not to be preserved through the winter without much difficulty, especially if you have not the convenience of a bark-stove to keep them in. The soil in which these plants should be placed, must be composed in the following manner, viz. half of light fresh earth taken from a pasture-ground, the other half sea-sand and rotten dung or tanners bark in equal proportion; these should be carefully mixed, and laid in a heap three or four months at least before it is used, but should be often turned over to prevent the growth of weeds, and to sweeten the earth.

PHOENIX, in ornithology, a bird famous among the ancients, but generally looked upon by the moderns as fabulous. The ancients speak of this bird as single, or the only one of its kind; they describe it as of the size of an eagle; its head finely crested with a beautiful plumage, its neck covered with feathers of a gold colour, and the rest of its body purple, only the tail white, and the eyes sparkling like stars: they hold, that it lives 500 or 600 years in the wilderness; that when thus advanced in age, it builds itself a pile of sweet wood and aromatic gums, and fires it with the wasting of its wings, and thus burns itself; and that from its ashes arises a worm, which in time grows up to be a phoenix. Hence the Phœnicians gave the name of *phœnix* to the palm-tree; because when burnt down,

phenic-
opterus,
phenix.

Plate
xxxviii.
fig. 1.

Pholas.

Plate
CCXXXVII
fig. 2.

down to the root, it rises again fairer than ever.

PHOLAS, a genus of insects, belonging to the order of vermes testacea. The shell is double-valved and divaricated; the cardo is turned backwards, and connected by a cartilage. There are fix species, distinguished by the figure of their shells.

The word *pholas* is derived from the Greek, and signifies something which lies hid. This name they derive from their property of making themselves holes in the earth, sand, wood, or stone, and living in them. The means of their getting there, however, are as yet entirely unknown. All that we can know with certainty is, that they must have penetrated these substances when very small; because the entrance of the hole in which the *pholas* lodges is always much less than the inner part of it, and indeed than the shell of the *pholas* itself. Hence some have supposed that they were hatched in holes accidentally formed in stones, and that the stones naturally grew of such a shape as was necessary to fill the cavity.

The holes in which the *Pholades* lodge are usually twice as deep, at least, as the shells themselves are long; the figure of the holes is that of a truncated cone, excepting that they are terminated at the bottom by a rounded cavity, and their position is usually somewhat oblique to the horizon. The openings of these holes are what betray the *pholas* being in the stone; but they are always very small, in proportion to the size of the fish. There seems to be no progressive motion of any animal in nature so slow as that of the *pholas*; it is immersed in the hole, and has no movement except a small one towards the centre of the earth; and this is only proportioned to the growth of the animal. Its work is very difficult in its motion; but it has great time to perform it in, as it only moves downward, sinking itself deeper in the stone as it increases itself in bulk. That part by means of which it performs this, is a fleshy substance placed near the lower extremity of the shell; it is of the shape of a lozenge, and is considerably large in proportion to the size of the animal; and though it be of a soft substance, it is not to be wondered at that in so long a time it is able, by constant work, to burrow into a hard stone. The manner of their performing this may be seen by taking one of them out of the stone, and placing it upon some soft clay; for they will immediately get to work in bending and extending that part allotted to dig for them, and in a few hours they will bury themselves in the mud in as large a hole as they had taken many years to make in the stone. They find little resistance in so soft a substance, and the necessity of their hiding themselves evidently makes them hasten their work. The animal is lodged in the lower half of the hole in the stone, and the upper half is filled up by a pipe of a fleshy substance and conic figure, truncated at the end: this they usually extend to the orifice of the hole, and place on a level with the surface of the stone; but they seldom extend it any farther than this. The pipe, tho' it appears single, is in reality composed of two pipes, or at least it is composed of two parts separated by a membrane. The use of this pipe or proboscis, is the same with that of the proboscis of other shell-fish, to take in sea-water into their bodies, and afterwards to throw it out again. In the middle of their bodies they have a small green vessel, the use of which has not yet

been discovered. This, when plunged in spirit of wine, becomes of a purple colour: but its colour on linen will not become purple in the sun like that of the murex; and even if it would, its quantity is too small to make it worth preserving.

The *pholas* is remarkable for its luminous quality. That this fish is luminous was noticed by Pliny, who observes that it shines in the mouth of the person who eats it; and, if it touch his hands or cloaths, makes them luminous. He also says that the light depends upon its moisture. The light of this fish has furnished matter for various observations and experiments to M. Reaumur and the Bolognian academicians, especially Beccarius, who took so much pains with the subject of phosphoreal light.

M. Reaumur observes, that whereas other fishes give light when they tend to putrescence, this is more luminous in proportion to its being fresh; that when they are dried, their light will revive if they be moistened either with fresh or salt water, but that brandy immediately extinguishes it. He endeavoured to make this light permanent, but none of his schemes succeeded.

The attention of the Bolognian academicians was engaged to this subject by M. F. Marfilins, in 1724, who brought a number of these fishes, and the stones in which they were inclosed, to Bologna, on purpose for their examination.

Beccarius observed, that though this fish ceased to shine when it became putrid, yet that in its most putrid state, it would shine, and make the water in which it was immersed luminous when it was agitated. Galeatus and Montius found that wine or vinegar extinguished this light; that in common oil it continued some days, but in rectified spirit of wine or urine hardly a minute.

In order to observe in what manner this light was affected by different degrees of heat, they made use of a Reaumur's thermometer, and found that water rendered luminous by these fishes increased in light till the heat arrived to 45°, but that it then became suddenly extinct, and could not be revived again.

In the experiments of Beccarius, a solution of sea-salt increased the light of the luminous water, a solution of nitre did not increase it quite so much. Sal ammoniac diminished it a little, oil of tartar *per deliquium* nearly extinguished it, and the acids entirely. This water poured upon fresh calcined gypsum, rock crystal, cerufs, or sugar, become more luminous. He also tried the effects of it when poured upon various other substances, but there was nothing very remarkable in them. Afterwards, using luminous milk, he found that oil of vitriol extinguished the light, but that of tartar increased it.

This gentleman had the curiosity to try how differently coloured substances were affected by this kind of light; and having, for this purpose, dipped several ribbons in it, the white came out the brightest, next to this was the yellow, and then the green; the other colours could hardly be perceived. It was not, however, any particular colour, but only light, that was perceived in this case. He then dipped boards painted with the different colours, and also glass tubes filled with substances of different colours, in water rendered luminous by the fishes. In both these cases, the

Pholas.

red

phos. red was hardly visible, the yellow was the brightest, and the violet the duldest. But on the boards, the blue was nearly equal to the yellow, and the green more languid; whereas in the glasses, the blue was inferior to the green.

Of all the liquors to which he put the pholades, milk was rendered the most luminous. A single pholas made seven ounces of milk so luminous, that the faces of persons might be distinguished by it, and it looked as if it was transparent.

Air appeared to be necessary to this light; for when Beccarius put the luminous milk into glass tubes, no agitation would make it shine, unless bubbles of air were mixed with it. Also Montius and Galeatus found, that, in an exhausted receiver, the pholas lost its light, but the water was sometimes made more luminous; which they ascribed to the rising of bubbles of air through it.

Beccarius, as well as Reaumur, had many schemes to render the light of these pholades permanent. For this purpose he kneaded the juice into a kind of paste with flour, and found that it would give light when it was immersed in warm water; but it answered best to preserve the fish in honey. In any other method of preservation, the property of becoming luminous would not continue longer than six months, but in honey it had lasted above a year; and then it would, when plunged in warm water, give as much light as ever it had done.

PHONICS, the doctrine or science of sounds, otherwise called ACOUSTICS. See that article.

PHOSPHORUS, a name given to certain substances which shine in the dark without emitting heat. By this circumstance they are distinguished from the *pyrophori*, which though they take fire on being exposed to the air, are yet entirely destitute of light before this exposure.

Phosphori are divided into several kinds, known by the names of *Bolognian phosphorus*, *Mr Canton's phosphorus*, *Baldwin's phosphorus*, *phosphorus of urine*, &c. of which the last is by far the most remarkable both with respect to the quantity of light which it emits, and its property of taking fire and burning very fiercely upon being slightly heated or rubbed. For the method of preparing these, see CHEMISTRY, n° 193, 476—486.

Besides these, however, it has been found that almost all terrestrial bodies, upon being exposed to the light, will appear luminous for a little time in the dark, metals only excepted. This points out a general division of the phosphori into two classes; namely, such as require to be exposed to the light either of the sun, or of some artificial fire, before they become luminous; and such as do not. Of the former kind are the *Bolognian phosphorus*, *Mr Canton's phosphorus*, the phosphori from earths, &c. Of the latter kind are rotten wood, the skins of fishes, and the phosphorus of urine. To these we may add some other substances which become luminous in another way; viz. the mass which remains after the distillation of volatile sal ammoniac with chalk, loaf-sugar, and the phosphorus of urine dissolved in spirit of wine. The first, which is a composition of the marine acid of the sal ammoniac with the chalk, after being fused in a crucible, becomes luminous when struck with any hard body; white sugar is luminous,

when grated or scraped in the dark; and the solution of phosphorus in spirit of wine is luminous only when dropped into water, and even then the light is only perceived where the drops fall into the liquid. One part of phosphorus communicates this property to 600,000 parts of spirit of wine.

There is a remarkable difference between the light of rotten wood, fishes, and that of phosphorus of urine, even when it is not in an ignited state; for this last does not cease to be luminous even when included within an exhausted receiver, the contrary of which happens to rotten wood and fishes. If air is strongly blown upon this phosphorus from a pair of bellows, it will extinguish its light for some time, which is not the case with the other kinds. When kept in water, and placed in a warm air, the phosphorus of urine discharges such large and bright flashes into the air above it, as are apt to surprise and even frighten those who are unacquainted with it. These coruscations are contracted in their passage through the water, but expand as soon as they get above it; however, the experiment can only be tried to advantage in warm weather, and in a cylindrical glass not above three quarters filled with water.

The phenomena exhibited by the earthy phosphori are very curious; both on account of the singular circumstances in which they exhibit their light, and the varieties observed in the light itself. All these, as has been already mentioned, emit no light till they have been first exposed to the light of the sun, or some other luminous body. After that, they are luminous in the dark for a considerable time; but by degrees their light dies away, and they emit no more till after another exposure to the sun. But if this happens to be too long continued, they are then irrecoverably spoiled. The same thing will happen from being too much heated without any exposure to light. Indeed, if a phosphorus, which has just ceased to be luminous, be heated, it will again emit light without any exposure to the sun; but by this its phosphoric quality is weakened, and will at last be destroyed. Indeed these phosphori are so tender, and impatient either of light or heat, that the best method of rendering them luminous occasionally is by discharging an electric bottle near them. The light of the flash immediately kindles the phosphorus, and it continues luminous for a considerable time, after which it may again be revived by another flash, and so on. However, with all the care that can be taken, these phosphori are very far from being perpetual; nor has any method been yet fallen upon to render them so.

The singularities in the light of the phosphori above-mentioned are, that they emit light of many different and most beautiful colours. This difference of colours seems to be natural to them; for some will at first emit a green, others a red, others a violet, &c. at their formation. However, the best kinds agree in this strange property, that if they are exposed to a red light, they emit a red light in the dark; and the same of other colours. But this must not be understood without limitation; nor is the phosphoral light at any time so bright as the luminous body, whatever it was, by which it was kindled. Neither are we to imagine, that any particular phosphorus has a particular kind of light appropriated to it; for the same phosphorus.

Phosphorus which at one time emits a purple light, will at another perhaps emit a green, or a light of some other colour.

The explanation of the principal phenomena of phosphorus is deducible from what has been shown concerning the nature of fire, compared with what is mentioned under the article QUICKLIME. Under this last article it is shown, that, when calcareous earths are deprived of their fixed air, a proportionable quantity of active fire is absorbed by them; that is, the ethereal fluid, which pervades all bodies, has a violent tendency to expand itself, or to act all around every particle of the calcined earth, as from a centre. Of consequence, if this tendency was not counteracted by some other power, these substances would emit a perpetual flame. This power, however, is found in our atmosphere; which has already been shown either to be the positive principle of cold, or to contain it*. Hence, the latent fire in these substances is checked, and cannot act, excepting within the very substance itself. But if any other body comes in contact with the calcined earth, in which the principle of cold is less vigorous than in the atmosphere, the active fire in the quicklime immediately shows itself, and the body either becomes hot, or is consumed as if by fire. Hence it will follow, that if a very inflammable body is touched by quicklime, it ought to be set on fire. But of this we have no instance, because it is impossible for the quicklime to part with any of its fire, unless it receives something in exchange. This indeed it might receive from the atmosphere; which could supply it either with more fire, if it was in a state of ignition; or with fixed air, if any substance was at hand to receive the fire. But the atmosphere refuses to part with the fire which it contains, because the effort of the fire in the quicklime is not sufficiently strong to overcome the opposition it meets with in other bodies; and, on the other hand, the effort of the fire in the quicklime is sufficient to keep the earth from attracting fixed air out of the atmosphere. But when water, for instance, is poured on the quicklime, the dry earth absorbs it very greedily, and parts with a proportionable quantity of its latent fire, which the water also absorbs much more readily than the atmosphere. Hence the mixture becomes so exceedingly hot as sometimes to fire combustible bodies. Now, if instead of water we suppose the lime to be mixed with oil, this also will absorb the fire; but not with such force as the water; neither is the heat by any means so considerable; because oil is capable of detaining a vast quantity of heat in a latent state, the only consequence of which is an increase of its fluidity, without any very perceptible change of temperature. At the same time, however, we must remember, that if the oil is in very small quantity, and intimately combined with the quicklime in that peculiar state which we call *phlogiston*, it is easy to conceive, that it may be so much saturated with fire, as to be unable to contain any more without being ignited. In this case, if more fire is forced into the compound, a quantity of the phlogistic matter which it contains will be decomposed; and of consequence, the fire which it has imbibed will be thrown out, as in the common ignition of vapour; and in proportion to the degree of heat thus communicated, will the degree of ignition, and the continuance of it be. If the quantity of heat

is very great, the phlogiston will be dissipated all at once; but if otherwise, the ignition will continue for a much greater length of time, as is the case with a common fire.

To apply this to the accension of phosphori, we must consider, that these substances are all formed by calcining calcareous substances, and combining them with some portion of phlogistic matter. Baldwin's phosphorus is made by dissolving chalk in the nitrous acid, afterwards evaporating the solution, and driving off most of the acid. The consequence of this is, that the earth is left in an exceedingly caustic state, as the acid expels the fixed air more completely than could be done almost by any calcination whatever; at the same time that any phlogistic matter which might have been contained in the mixture is most accurately diffused through it, and combined with it. The Bolognian phosphorus is composed of a gypseous earth, which contains a quantity of vitriolic acid; and as no mineral is to be found perfectly free from phlogistic matter, the vitriolic acid unites with it during the calcination into an exceedingly inflammable sulphur; for the greater the quantity of acid there is in proportion to the phlogiston, the more inflammable is the compound†. Thus the Bolognian, as well as Baldwin's phosphorus, is a compound of quicklime and inflammable matter; and the case is still more plain with regard to Mr Canton's, where the quicklime is mixed with sulphur, and both calcined together.—Neither are the phosphori made by calcining oyster-shells without addition to be accounted any way different from those already mentioned; since the shells always contain some portion of inflammable matter, which, being reduced to a coal by the action of the fire, furnishes a quantity of phlogiston, and imparts it to the whole of the calcareous matter.

Having thus seen that the phosphori of which we now speak are all composed of pure calcareous earth and phlogiston, we are next to consider, that the phlogiston must be in such a state as it is when saturated with fire and ready to inflame. It is not indeed in the state of vapour, because this would require a quantity of fire detached from any other substance, and interposed between the particles of the vapour, in order to keep them at a distance, or to give it elasticity. But the fire which ought to do this is confined by the calcareous earth, which also detains the phlogiston itself. As long therefore as the balance is thus preserved, the phosphorus cannot shine; but as soon as a fresh quantity of light is discharged upon it, then more light or fire (for they are the very same in this case), enters the quicklime than it can contain. The consequence of this is, that the quantity which cannot be retained by the earth, exerts its force upon the phlogiston; which having already as much as it can hold, not only the superfluous quantity is discharged, but also part of that which the phlogiston had absorbed before. The burning indeed is very slow and weak, because the phlogiston is obliquately retained by the earth, which both impedes the ignition, and prevents the dissipation of the phlogiston in vapour. However, as soon as the lime has by its action impeded the farther extrication of the phlogiston, the balance is restored, the fire goes out, and the phosphorus ceases to be luminous. Heat will kindle it again; but thus a larger quantity of phlogistic

* See the article GOLD, no 4.

† See the article SULPHUR.

phosphorus phlogistic matter is dissipated, and the phosphorus is soon destroyed. Light does the same, but in a much more moderate degree; and therefore the phosphorus may be frequently rekindled by means of light, and will continue its splendor for a long time. But if the light is too long continued, or too violent, it will produce the same consequence whether it is attended with perceptible heat or not.

With regard to the phosphorus of urine, the case is the same; only, instead of the calcareous earth, we have here an acid joined with phlogiston. The latter is in exceeding small quantity, and of consequence so loaded with fire that the least additional heat, rubbing, or alteration in the weather, forces more fire upon it than it can bear, and therefore part of it is continually flashing off in those coruscations formerly mentioned. The reason why this phosphorus flashes like lightning, and the others give only a steady light like coals, is, that the compound is very volatile. It requires indeed a violent fire to distill it at first; but in the distillation so much fire is imbibed, that it seems ever afterwards ready to evaporate spontaneously; and therefore phosphorus, when once made, is easily redistilled in close vessels.

It now remains only to show the reason why the phosphorus of urine and some others will shine under water, or in an exhausted receiver, while rotten wood, &c. will not. This seems to arise from the quantity of fire which they have internally, and which requires no supply from the external air as in the case of common fire: and hence the phosphorus of urine shines more briskly *in vacuo* than in the air; because the pressure of the atmosphere is then taken off, and the evaporation of the phlogistic matter promoted. The light of filices and rotten wood seems to be of an electric nature; and therefore ceases when the air is exhausted, as on this fluid all the phenomena of electricity are found to depend.

With regard to the various colours of phosphoric light, some have imagined that the earthy substance was capable of imbibing a certain quantity of light, and emitting it afterwards in the very same state, and having the same colour which it had before. But this is now known to be a mistake, and the light of the phosphori is found to be owing to a true accension, though weak, as in other burning bodies. Hence it is very probable that the colour of the light depends upon the degree of accension; for we see that even in common fires the colour depends in a great measure on the strength of the flame. Thus the flame of a candle, where it is not well kindled at bottom, always appears blue. The flame of a small quantity of sulphur, or of spirit of wine, is blue; but if a large quantity of either of these substances be set on fire, the flame will in many places appear white. A strong flame mixed with much smoke appears red. A weak one in similar circumstances appears brown, &c. Hence if the phosphorus is weakly kindled, it will emit a brown, violet, blue, or green flame; if strongly, a red or white one.

It has already been mentioned, that almost all terrestrial bodies have a phosphoric quality; however this, in most of them, is extremely weak, and continues only for a very short time. Signor Beccaria, who discovered this property, in order to find out what

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substances were phosphoric, and what were not, had a machine contrived like a dark lantern, in which he included himself, in order to perceive with the greater facility any small quantity of light which might be emitted by the substances which he designed to examine. In the side of the machine was a cylinder capable of being turned about without admitting any light. Upon this were passed the substances he designed to examine, and by turning the cylinder he immediately brought them from the light of the sun into intense darkness; in which situation there were but few substances which did not afford a sufficient quantity of light to render themselves visible. This phenomenon, however, is evidently similar to an optical illusion by which we are made to see what is not present before us; for if we look very intently upon any thing for some time, suffering no more light to enter our eyes than what is reflected from that object, we will imagine that we still see it, though we remove into the dark or shut our eyes. The reason of this is, that the nervous fluid being once put in motion after a certain manner, continues that motion for a short space of time after the moving cause is removed. In like manner, as the light is partly reflected from bodies, and partly penetrates them, when any body is exposed to the light, and then is suddenly brought into a dark place, the ethereal fluid within its substance being once put into motion does not cease to move immediately, but for a time produces that vibration which we call *light*; for the substance of light is present in the most intense darkness as well as in sunshine. Hence almost all substances are capable of emitting light in the dark, after being exposed to a vigorous sunshine; though the reason of their doing so may be very different from that by which the phosphori become luminous.

Many entertaining experiments may be made with the various kinds of phosphori, especially with that of urine. This last, however, is sometimes dangerous on account of the violence with which it burns. If dissolved in oil of cloves, it loses this property, but continues to be as luminous as before; so that this mixture, called *liquid phosphorus*, may be used with safety. As on some occasions it may be wished to have it in powder, it is proper to observe that this may be done with safety by pouring some hot water upon the phosphorus in a glass mortar. The compound melts, and while in a soft state is easily reducible to powder of any degree of fineness.

Acid of PHOSPHORUS. This acid, called also the *microcosmic acid*, has already been described, and the method of procuring it from urine shown, under the article CHEMISTRY, n° 307, 308. Since that article was written, however, it has been discovered by Mr Schele, that an acid capable of making phosphorus is producible from calcined bones or hartshorn, and the vitriolic acid. The process for procuring this acid recommended by that gentleman was to dissolve the bones in nitrous acid; afterwards to precipitate the earth by means of the vitriolic acid; to filter and evaporate the liquor to dryness; and, after driving off the nitrous acid, the phosphoric acid remains. This process, however, is expensive on account of the waste of nitrous acid; and is likewise very inconvenient, because a great deal of the earthy matter continues dissolved,

Phosphorus even after the vitriolic acid is poured in, and therefore the phosphoric acid is never to be obtained pure; for which reason, the following process is preferable.

Take of calcined bones or hartshorn, one pound; oil of vitriol, 14 ounces. Let the bones be reduced to fine powder; then pour on the acid undiluted, and rub both together till they are as accurately mixed as possible. Having let them remain for some hours in this situation, pour on as much water, stirring and dissolving the lumps into which the mass will now be concreted, till it is all equally distributed through the liquid, and has the confidence of thick gruel. Let it remain 24 hours, and then pour it into a canvas cloth in order to let the liquid drain from it. This is a very tedious operation, as fresh water must continually be pouring on till all the saline matter is washed off. When this is done, pour into the liquid a quantity of caustic volatile alkali, which will occasion a copious precipitation; for the earth of bones is much less strongly attracted by acids than even the caustic volatile alkali. The liquid being now filtered a second time, which will be done with sufficient ease, and afterwards evaporated, there remains a mass composed of phosphoric acid, and vitriolic fial ammoniac. By increasing the fire, the latter is dissipated in vapour; and if the process has been successful, four ounces or more of pure phosphoric acid will remain.

With regard to the properties of this acid, it is not yet ascertained whether they are exactly the same with the microcosmic acid or not. Indeed, as far as yet appears, they seem to be different; and there are very strong reasons for supposing that the phosphoric acid thus produced is no other than the vitriolic altered by its combination with the earth of bones. See the article **BONES** in the **APPENDIX**.

PHOTIUS, patriarch of Constantinople, was one of the finest geniuses of his time, and his merit raised him to the patriarchate; for Bardas having driven Ignatius from the see, Photius was consecrated by Asclepius in 859. He condemned Ignatius in a synod, whereupon the pope excommunicated him, and he, to balance the account, anathematized the pope. Basilus of Macedon, the emperor whom Photius had reproved for the murder of Michael the late emperor, expelled him, and restored Ignatius; but afterward re-established Photius, upon Ignatius's death, in 878. At last, being wrongfully accused of a conspiracy against the person of Leo the philosopher, son and successor to Basilus, he was expelled by him in 886, and is supposed to have died soon after. He wrote a *Bibliotheca*, which contains an examen of 280 authors: we have also 253 epistles of his; the *Nomocanon* under 14 titles; an abridgment of the acts of several councils, &c. He was a person of prodigious reading, and the greatest scholar almost of any age.

PHRASE, in grammar, an elegant turn or manner of speech, peculiarly belonging to this or that occasion, this or that art, or this or that language. Thus we say, an Italian phrase, an eastern phrase, a poetical phrase, a rhetorical phrase.

PHRASE is sometimes also used for a short sentence, or small set or circuit of words constructed together. In this sense, Father Buffier divides phrases into complete and incomplete.

PHRASES are complete where there is a noun and a

verb, each in its proper function; *i. e.* where the noun expresses a subject, and the verb the thing affirmed of it.

INCOMPLETE PHRASES are those where the noun and the verb together only do the office of a noun; consisting of several words without affirming any thing, and which might be expressed in a single word. Thus, *that which is true*, is an incomplete phrase, which might be expressed in one word, *truth*; as "that which is true satisfies the mind," *i. e.* "truth satisfies the mind."

PHRASEOLOGY, a collection of the phrases, or elegant expressions, in any language. See **PHRASE**.

PHRENTIS, the same with **PHRENSY**; an inflammation of the meninges of the brain, attended with an acute fever and delirium. See **MEDICINE**, n° 284.

PHRYGIA, an extensive country of the Hither Asia, on this side mount Taurus, and the river Halys. Reckoned by the ancients twofold, viz. the *Greater* and *Less*, (Livy, Ptolemy.) The *Less* Phrygia seems to have consisted of two parts; one nearer the Hellespont, from which it is called *Hellespontica*: the other, which was to the south of Bithynia, about Olympus, more remote from the Hellespont, and under the dominion of Prusias; but which was afterwards ceded to the Attali, or to Eumenes, by them called *Epictetos*; which in a laxer sense denotes the Minor Phrygia, or the *Less*; but in a stricter, is distinct from the Phrygia on the Hellespont, and lies at the foot of Olympus, a mountain of Mylia, on the confines of Bithynia: so that we have three Phrygias; Major, Minor, and Epictetos.

PHTHIRIASIS, the **LOUSY EVIL**, from *phus*, "a louse." It is a lousy distemper; children are frequently its subjects, and adults are sometimes troubled with it. The increase of lice, when in a warm moist situation, is very great; but a cold and dry one soon destroys them. On the human body four kinds of lice are distinguished: 1. The *pediculi*, so called because they are more troublesome with their feet than by their bite. These are in the heads of children, especially if sore or scabby; and often in those of adults, if they are slothful and nasty. 2. Crab-lice, see **CRAB-LICE**. 3. Body lice; these infest the body, and breed in the clothes of the nasty and slothful. 4. A sort which breed under the cuticle, and are found in the hands and feet: they are of a round form, and so minute as often to escape the sight; by creeping under the scarfskin they cause an intolerable itching; and when the skin bursts where they lodge, clusters of them are found there. See **ACARUS**.

A good diet and cleanliness conduce much to the destruction of lice. When they are in the head, comb it every day; and, after each combing, sprinkle the pulver. staph. agr. or coccul. Ind. among the hairs every night, and confine it with a tight cap.

Codrochius, in his treatise on lice, says, that the powdered coc. Ind. exceeds all other means; and that it may be mixed in the pulp of apple, or in lard, and applied every night to the hair. Some writers assert, that if the pul. cort. rad. sassafr. is sprinkled on the head, and confined with a handkerchief, it destroys the lice in one night.

The body-lice are destroyed by any bitter, sour, salt, or mercurial medicine, if applied to the skin.

The

Phrasco-
logy
Pthiriasis.

Orthitis The black soap, and the flowers called *cardamine*,
or *lady's-smock*, are said to be specifics in all cases of
hyfter. lice on the human body.

PHTHISIS, a species of consumption, occasioned by an ulcer in the lungs. See *MEDICINE*, n° 351—353. and p. 4870, 4871.

PHUL, or *Put*, king of Assyria, by some historians said to be Ninus under another name, and the first founder of that monarchy: A renowned warrior. He invaded Israel in the reign of Manahem, who became tributary to him, and paid him 1000 talents of silver for a peace. Flourished 771 B. C.

PHYLACTERY, in the general, was a name given by the ancients to all kinds of charms, spells, or characters, which they wore about them, as amulets, to preserve them from dangers or diseases.

PHYLACTERY particularly denoted a slip of parchment, wherein was wrote some text of holy scripture, particularly of the decalogue, which the more devout people among the Jews wore on the forehead, the breast, or the neck, as a mark of their religion.

The primitive Christians also gave the name *phylacterie* to the cases wherein they inclosed the relics of their dead.

PHYLICA, *BASTARD ALATERNUS*; a genus of the monogynia order, belonging to the pentandria class of plants. There are six species, of which three are kept in the gardens of this country; but, by reason of their being natives of warm climates, they require to be kept in pots, and housed in winter. They are all shrubby plants, rising from three to five or six feet high; and adorned with beautiful clusters of white flowers. They are propagated by cuttings.

PHYLLANTHUS, *SEA-SIDE LAUREL*; a genus of the triandria order, belonging to the monoecia class of plants. There are six species, all of them natives of warm climates; and rise from 12 or 14 feet, to the height of middling trees. They are tender, and cannot be propagated in this country without artificial heat.

PHYSALIS, the *WINTER CHERRY*; a genus of the monogynia order, belonging to the pentandria class of plants. There are 16 species; of which the most remarkable is the alkekengi, or common winter-cherry. This grows naturally in Spain and Italy. The roots are perennial, and creep in the ground to a great distance if they are not confined. These, in the spring, shoot up many stalks, which rise to the height of a foot or more, garnished with leaves of various sorts; some of which are angular and obtuse, some oblong and sharp pointed, with long foot-stalks. The flowers are produced from the wings, standing upon slender foot-stalks; are of a white colour, and have but one petal. They are succeeded by round berries about the size of small cherries, inclosed in an inflated bladder, which turns red in autumn, when the top opens and discloses the red berry, which is soft, pulpy, and filled with flat kidney-shaped seeds. Soon after the fruit is ripe, the stalks decay to the root. The plant is easily propagated, either by seeds, or parting the roots.

PHYSETER, or *SPERMACETI-FISH*, in zoology, a genus belonging to the order of cetæ. There are four species; the most remarkable are,

1. The microps, or black-headed cachalot, with a long fin on the back, and the upper jaw consider-

ably longer than the under one. A fish of this kind was cast ashore on Crumond isle, near Edinburgh, December 22d, 1769; its length was 54 feet; the greatest circumference, which was just beyond the eyes, 30: the upper jaw was five feet longer than the lower, whose length was ten feet. The head was of a most enormous size, very thick, and above one-third the size of the fish: the end of the upper jaw was quite blunt, and near nine feet high: the spout hole was placed near the end of it. The teeth were placed in the lower jaw, 23 on each side, all pointing outwards; in the upper jaw, opposite to them, were an equal number of cavities, in which the ends of the teeth lodged when the mouth was closed. One of the teeth measured eight inches long, the greatest circumference the same. It is hollow within side for the depth of three inches, and the mouth of the cavity very wide: it is thickest at the bottom, and grows very small at the point, bending very much; but in some the flexure is more than in others. These, as well as the teeth of all other whales we have observed, are very hard, and cut like ivory. The eyes are very small, and remote from the nose. The pectoral fins placed near the corners of the mouth, and were only three feet long: it had no other fin, only a large protuberance on the middle of the back. The tail was a little forked, and 14 feet from tip to tip. The penis seven feet and a half long. Linnæus informs us, that this species pursues and terrifies the porpoises to such a degree as often to drive them on shore.

2. The catodon, or round-headed cachalot, with a finula in the snout, and having no back fin. Of this species, a hundred and two of different sizes were cast ashore at one time, on one of the Orkney Isles, the largest 24 feet in length. The head is round, the opening of the mouth small: Sibbald says it has no spout-hole, but only nostrils. But Mr Pennant is of opinion, that the former being placed at the extremity of the nose has been mistaken by him for the latter. Some teeth of this species are an inch and three quarters long, and in the largest part, of the thickness of one's thumb. The top is quite flat, and marked with concentric lines; the bottom is more slender than the top, and pierced with a small orifice; instead of a back fin there was a rough space.

For the method of extracting the spermaceti from the brain of these creatures, see the article *SPERMACETI*.

PHYSIC, or *PHYSICK*, the art of healing; properly called *MEDICINE*. The word is formed from the Greek *phusis*, "nature;" in regard medicine consists principally in the observation of nature. See *PHYSICS* and *MEDICINE*.

PHYSICAL, something belonging to, or really existing, in nature. In this sense we say a physical point, in opposition to a mathematical one, which only exists in the imagination; a physical substance or body, in opposition to spirit, or metaphysical substance, &c.

PHYSICIAN, a person who professes medicine, or the art of healing diseases. See *MEDICINE*.

PHYSICS, or *NATURAL PHILOSOPHY*. By the word *physics*, in its most extensive sense, we understand *The science of the operations of nature, and of its productions*. This definition is alone sufficient to inform us, what are

Physieter,
Physics.

Physics.

the particular parts of physics, and what are the means it employs to attain its ends. Thus *NATURAL HISTORY*, or *ZOOLOGY*, *BOTANY*, and *MINERALOGY*, describe those bodies that nature produces, as far as they are discernible by our senses. So *CHEMISTRY* and *EXPERIMENTAL PHILOSOPHY* discover to us, at least in part, the composition of bodies, and the various alterations of which those compositions are susceptible. So *General and Speculative PHYSICS* draws from all these preliminary observations, from all these matters of fact, just consequences relative to the universal laws of nature, to the properties, forces, action, and essential qualities of bodies.

The object of physics being the examination of the whole frame of nature, so far as it is visible and palpable to man, it is easily to conceive, that it must form the most extensive branch of human knowledge, seeing that the operations of nature are varied almost to infinity. To reduce this immense subject into some order, philosophers have begun by dividing all the productions of this globe into three classes, which they call *kingdoms*, and distinguish into the *vegetable*, the *mineral*, and *animal kingdom*. Botany, mineralogy, and natural history properly so called, teach therefore all that is come to the knowledge of man in each of these kingdoms. Chemistry resolves all bodies, and consequently shows the manner in which they are compounded. Philosophers have likewise discovered that the universe is composed of elements, of which there are four, *EARTH*, *WATER*, *FIRE*, and *AIR*. Experimental philosophy, by numberless essays and observations, explains the manner in which these elements operate upon each other, and the effects that they produce. The knowledge of those heavenly bodies, whose various courses fill the vast expanse of the firmament, and of their properties and courses either real or apparent, is comprised in the science of *ASTRONOMY*.

All the ancient oriental nations, including the Hebrews and the Egyptians, were mere novices in physics; and their ignorance seems to prove the infancy of the world. The Greeks, men of a subtle and inquisitive genius, went further, and sometimes guessed right enough, though very rarely. Empedocles, for example, who is ranked by some among the Pythagoreans, professed the system of the four elements in nature; and added thereto two principles, which he called *principium amicitie*, and *principium contentioni*. The first, according to him, is the cause of the coalition of beings; and the second, that of their recession or separation. Was not this derived from the same origin as the celebrated system of the attraction and repulsion of bodies? Whatever was the cause, the progress of physics has ever been slow; and we are astonished when we see ancient writers of the greatest genius, as Plutarch and an hundred others, make use of such wretched reasoning when they mention those subjects that relate to physics.

Among the Romans, Lucretius and Cicero have indeed written on these subjects; but they have only related the opinions of the Greeks, which were not worthy of great regard. Seneca and Pliny went further; and we are obliged to the latter for the useful observations which he has made on many parts of this science, although he is frequently too credulous. Pliny, moreover, does not belong to the class of dogmatic

authors on physics, as he gives only an historical account of these matters.

The first ages of Christianity were the ages of darkness for all the sciences and the arts. It was not till very late, that Bacon baron of Verulam, and some of his contemporaries, produced the first sparks of those fair lights that have since blazed forth by the happy labours of their successors. Gassendus, Descartes, Rudiger, Newton, Leibnitz, Wolff, and a multitude of other celebrated philosophers, have diffused these lights over philosophy; and all these great men have at last established that method of treating it which is alone able to discover the truth. This method is perfectly simple. They begin with establishing facts by means of experiments and observations, and draw from thence consequences relative to their causes and principles. For, as soon as experience or the senses have discovered what passes in nature, the mind endeavours to discover what cannot be distinguished by the senses; that is to say, what may be the cause or the end of each phenomenon or operation in nature; and by this means it constantly combines the accuracy of observation with the sagacity and rigour of argument.

It is certain, that a diligent observation of the subjects of *MINERALOGY* and *ZOOLOGY*, united with the study of *BOTANY*, affords every possible information relative to natural history in general; that is, we thereby acquire the historical knowledge of all the beings of this globe, that nature produces. *EXPERIMENTAL PHILOSOPHY*, aided by *CHEMISTRY*, and several parts of the *MATHEMATICS*, disclose the composition of these beings, and the springs by which nature operates in their production, and in making them produce, in their turn, the mutual effects of the elements, &c. *ASTRONOMY*, of which we have in like manner treated, explains the nature of the celestial bodies and their courses: and all these various sciences, united, conduct us at last, as far as the human mind is able to proceed, to the determination of the general laws of nature in the order of the universe; from whence result *universal and speculative Physics*, of which it remains to give a cursory idea. This science, which for some thousand years has been justly called *speculative*, seeing that it has been founded altogether on vain speculations, and suppositions merely ideal, is at length supported by experiments and observations that bear the stamp of manifest demonstrations. It now forms no system, admits of no hypothesis, but such whose veracity and certainty have been previously demonstrated. For which purpose it calls to its assistance all the subordinate sciences, and makes use of their operations in the investigation and establishment of its principles. As *MINERALOGY*, *BOTANY*, *ZOOLOGY*, *CHEMISTRY*, *ANATOMY*, *PHYSIOLOGY*, and almost all the other parts of *PHYSICS*, *GEOGRAPHY*, *EXPERIMENTAL PHILOSOPHY*, all the particular sciences which are comprised under the general denomination of *MATHEMATICS*; all these have relation to general physics, and each of them concurs more or less to furnish materials for its sublime operations. When, by the assistance of the labours of these, physics has established the veracity of facts, it then applies the most subtle, abstract, and profound ratiocination, to draw from thence just consequences, and to establish general principles, founded on these facts, relative to the universal laws of nature; to

Physics.

to the celestial bodies, and the true order of the universe; to the elements, and their reciprocal action; to meteors; to bodies that are both visible and tangible; to the reciprocal action of palpable bodies; to the generation of beings in general, and of man in particular; to every production of nature in all the three kingdoms: in a word, it endeavours to account, as far as the weak lights of the human understanding are capable of accounting, for all the phenomena of heaven and earth. See all the abovementioned sciences severally treated in the order of the alphabet.

PHYSIOGNOMONICS, among physicians, denote such signs as, being taken from the countenance, serve to indicate the state, disposition, &c. both of the body and mind: and hence the art of reducing these signs to practice is termed *physiognomy*.

PHYSIOGNOMY, the art of knowing the humour, temperament, or disposition of a person, from observation of the lines of his face, and the characters of its members or features. The word is formed from the Greek φυσικ, "nature," and γινωσκω, "I know."

Baptista Porta and Robert Fludd are the principal modern authors on physiognomy. The ancient ones are the sophist Adamantius, and Aristotle: the physiognomy of which last we have translated into Latin by De Lacuna.

There seems to be something in physiognomy, and it may perhaps bear a much purer philosophy than what these authors were acquainted withal. This, at least, we dare say, that of all the fanciful arts of the ancients, diffused among the moderns, there is none has so much foundation in nature as this.

There is an apparent correspondence between the face and the mind. The features and lineaments of the one are directed by the motions and affections of the other. there is even a peculiar arrangement of the members of the face, a peculiar disposition of the countenance, to each particular affection, perhaps to each particular idea of the mind. In effect, the language of the face, *physiognomy*, is as copious, nay, perhaps as distinct and intelligible, as that of the tongue.

The foundation of physiognomy is this: The different objects that present themselves to the senses, nay, the different ideas that arise in the mind, do each make some impression on the spirits; and each an impression correspondent or adequate to its cause; therefore each a different impression.

Now, if by repeated acts, or the frequent entertaining of a favourite passion, or vice, which natural temperament has hurried or custom dragged one to, the face is often put in that posture which attends such acts; the animal-spirits will make such patent passages through the nerves (in which the essence of a habit consists), that the face is sometimes unalterably set in that posture, or at least falls insensibly and mechanically into that posture, unless some present object distort it therefrom, or dissimulation hide it.

This reasoning is confirmed by observation. Thus we see great drinkers with eyes generally set to the nose; the adductor muscles being often employed to put them in that posture, in order to view their loved liquor in the glass in the time of drinking; whence those muscles are also denominated *bibitory muscles*. Thus also lascivious persons are remarkable for the

ocularum mobilis petulantia, as Petronius calls it.—*Physiognomy*, Hence we may account for the Quakers expecting face waiting the spirit, the melancholy face of most sectaries, the studious face of men of great application of mind, &c.

Were our observation a little more strict and delicate, we might doubtless not only distinguish habits and tempers, but even professions.—In effect, does there need much penetration to distinguish the fierce look of the veteran soldier, the contentious look of the practised pleader, the solemn look of the minister of state, &c.

Within these few years, one M. Lavater of Zurich has attempted to revive the trade of physiognomy, and published a quarto volume on the certainty and utility of the art. His reasons for believing in it, besides those already given, are to the following purpose. "Every moment we are acting upon physiognomical principles, without being aware of it; and not men only, but the brutes also, even insects, both know their most convenient food, and their enemies, by the outside. What are we doing when we choose out some fruits as the best, or when we prefer one horse to another, but judging, from the outside, of the internal qualities? We then certainly act the physiognomer. That every man is undoubtedly a natural physiognomer, is still more apparent from considering the effects which result from the first sight of persons unknown. We are often much inclined to tell our friends, that we do not like the man before us, altho' we be in no degree acquainted with him. Whoever is an attentive observer of what passes in his own mind, knows that he no sooner sees any person, than certain attendant ideas succeed the first impression, which involve nothing less than a judgment over his dispositions of mind, so far that we pronounce him to be of a quite different cast from some others of our acquaintance. We cannot, in every case, tell exactly why we judge thus, whether it be from his figure, from his eyes, or from his nose. Nor can we always determine, whether the impression be not from different ideas complicated. This is not to be learned by rule; we judge only from a feeling acquired by experience. As physiognomical practice is general, it cannot be but founded in nature; and one should think, therefore, that it possibly might be the subject of science. Does not practice always precede theoretical knowledge?"

The rules for this extraordinary art are not laid down in the volume we now speak of; however, so many things are necessary on the part of the artist, that no body, it would seem, without a tolerable share of self-sufficiency, could engage in the art. The reason is, that it requires virtue in the artist to perceive virtue in the face of him whom he inspects; and consequently, unless the physiognomist is possessed of all the virtues in the world, he will be perpetually drawing false conclusions; for, "No one, (says our author,) certainly is able to discern the look of magnanimity, or the countenance of an exalted soul, but he who is magnanimous himself, who thinks nobly, and who is disposed to act generously."

PHYSIOLOGY, properly denotes a discourse of nature, and natural bodies; or, it is that part of natural philosophy which treats of the various phenomena

Phytology mena of nature in a scientific and speculative way. See **PHYSIOLOGY**.

Picardy.

Among physicians, the term *phytology* denotes the history of the human body, and its several constituent parts, with their relations and functions. See **ANATOMY**.

PHYTOLOGY, a discourse concerning the kinds and virtues of plants. See **BOTANY**, and **MATERIA Medica**.

PIAZZA, in building, popularly called *piache*, an Italian name for a portico, or covered walk, supported by arches.

The word literally signifies a broad open place or square; whence it also became applied to the walks or portico's around them.

PICA, in ornithology. See **CORVUS**.

PICA, in medicine, a deprivation of appetite, which makes the patient long for what is unfit for food, or incapable of nourishing; as chalk, ashes, coals, platter-lime, &c. See **MEDICINE**, n° 465.

PICARD, a native of the Netherlands, who improved upon the errors of the Adamites. He called himself the Son of God; and pretended, that, like a new Adam, he was sent by his father to restore the law of nature, which, according to him, chiefly consisted in community with respect to women, and in going quite naked. It is said, that though marriage was instituted among them, no man was allowed to lie with a woman without first obtaining leave of the chief of the sect. He fortified himself in an island in the river Lifmik, seven leagues from Thabor, the military residence of the famous Zisca; but unhappily for him, 40 of his followers being gone out upon a party, basely plundered some country houses, and killed upwards of 200 persons; upon which Zisca attacked the island, took it, and put all the Picards to the sword, except two, whose lives he spared in order to learn from their own mouths the principles of their religion. This happened in the year 1420.

PICARD (John), an able mathematician, and one of the most learned astronomers of the 17th century, was borne at Fleche, and became priest and prior of Rillie in Anjou. Going to Paris, he was in 1666 received into the Academy of Sciences, in quality of astronomer. In 1671, he was sent, by order of the king, to the castle of Uraniburg, built by Tycho Brahe in Denmark, to make astronomical observations there; and from thence he brought the original manuscripts wrote by Tycho Brahe, which are the more valuable as they differ in many places from the printed copies, and contain a book more than has yet appeared. He made important discoveries in astronomy; and was the first who travelled through several parts of France, to measure a degree of the meridian. His works are, 1. A treatise on levelling. 2. Fragments of dioptrics. 3. *Experimenta circa aquas effluentes*. 4. *De mensuris*. 5. *De mensura liquidorum & aridorum*. 6. A voyage to Uraniburg, or astronomical observations made in Denmark. 7. Astronomical observations made in several parts of France, &c. These, and some other of his works, which are much esteemed, are in the sixth and seventh volumes of the Memoirs of the Academy of Sciences.

PICARDY, a province of France, bounded on the north by Hainault, Artois, and the sea; on the east,

by Champagne; on the south, by the isle of France; and on the west, by Normandy and the British channel. It is divided into the Upper, Middle, and Lower Picardy; and the principal rivers are the Somme, the Oyse, the Canche, the Lis, the Scarp, the Deule, and the Aa. The soil is very fertile in corn, fruits, and pastures; but it produces no wine. They have a considerable trade in woollen manufactures, and the inhabitants are a very industrious people. Amiens is the capital town.

PICART (Bernard), a celebrated engraver, son of Stephen Picart, also a famous engraver, was born at Paris in 1673. He learned the elements of his art from his father, and studied architecture and perspective under Sebastian le Clerc. As he embraced the reformed religion, he settled in Holland to enjoy the free exercise of it; where his genius produced those masterpieces which made him esteemed the most ingenious artist of his age: and a multitude of books are embellished with plates of his engraving. He died in 1733.

PICENTIA, (Strabo, Pliny); the capital of the Picentini, whose territory, called *Ager Picentinus*, a small district, lay on the Tufcan sea, from the *Promontorium Minerva*, the fourth boundary of Campania on the coast, to the river Silarus, the north boundary of Lucania, extending within-land as far as the Samnites and Hirpini, though the exact termination cannot be assigned. The Greeks commonly confound the *Picentini* and *Picentes*, but the Romans carefully distinguish them. The former, with no more than two towns that can be named, *Silernum* and *Picentia*; the situation of both doubtful: only Pliny says the latter stood within-land, at some distance from the sea. Now thought to be *Bicenza*, (Holstenius), in the *Principato Citra* of Naples.

PICENUS, (Cæsar, Pliny, Florus); **PICENUS AGER**, (Cicero, Sallust, Livy, Tacitus); *Ager Picentinus*, (Varro): a territory of Italy, lying to the east of Umbria, from the Apennine to the Adriatic; on the coast extending from the river Aefis on the north, as far as the *Præutiani* to the south. In the upper or northern part of their territory the Umbri excluded them from the Apennine, as far as *Camerinum*, (Strabo); but in the lower or southern part they extended from the Adriatic to the Apennine. A very fruitful territory, and very populous. *Picentes*, the people, (Cicero); from the singular, *Picens*, (Livy): different from the *Picentini*, on the Tufcan sea, tho' called so by the Greeks; but Ptolemy calls them *Piceni*, as does also Pliny. Their territory at this day is supposed to form the greatest part of the March of Ancona, (Cluverius.)

PICKERY, in Scots law, petty theft, or stealing things of small value.

PICKETS, in fortification, stakes sharp at one end, and sometimes shod with iron, used in laying out the ground, of about three feet long; but, when used for pinning the fascines of a battery, they are from three to five feet long.

PICKETS, in artillery, are about five or six feet long, shod with iron, to pin the park lines, in laying out the boundaries of the park.

PICKETS, in the camp, are also stakes of about six or eight inches long, to fasten the tent cords, in pitching the tents; also, of about four or five feet long, driven

Picart
Pickets

Picket
Piquet.

ven into the ground near the tents of the horsemen, to tie their horses to.

PICKET, an out-guard posted before an army, to give notice of an enemy approaching.

PICKET, a kind of punishment so called, where a soldier stands with one foot upon a sharp-pointed stake: the time of his standing is limited according to the offence.

PICQUERING, a flying war, or skirmish, made by soldiers detached from two armies for pillage, or before a main battle begins.

PIQUET, or PICKET, a celebrated game at cards, much in use throughout the polite world.

It is played between two persons, with only 32 cards; all the duces, threes, fours, fives, and sixes, being set aside.

In reckoning at this game, every card goes for the number it bears, as a ten for ten; only all court-cards go for ten, and the ace for eleven: and the usual game is one hundred up.—In playing, the ace wins the king, the king the queen, and so down.

Twelve cards are dealt round, usually by two and two; which done, the remainder are laid in the middle: if one of the gamblers finds he has not a court-card in his hand, he is to declare he has *carte blanche*, and tell how many cards he will lay out, and desire the other to discard, that he may shew his game, and satisfy his antagonist that the *carte-blanche* is real; for which he reckons ten.

Each person discards, *i. e.* lays aside a certain number of his cards, and takes in a like number from the stock.—The first, of the eight cards, may take three, four, or five; the dealer all the remainder, if he pleases.

After discarding, the eldest hand examines what suit he has most cards of; and reckoning how many points he has in that suit, if the other have not so many in that or any other suit, he tells one for every ten of that suit.—He who thus reckons most is said to win the point.

The point being over, each examines what *sequences* he has of the same suit, *viz.* how many tierces, or sequences of three, quarts or fours, quintes or fives, sixemes or six's, &c. For a tierce they reckon three points, for a quart four, for a quinte 15, for a sixieme 16, &c. And the several sequences are distinguished in dignity by the cards they begin from: thus ace, king, and queen, are called *tierce major*; king, queen, and knave, *tierce to a king*; knave, ten, and nine, *tierce to a knave*, &c. and the best tierce, quart, or quinte, *i. e.* that which takes its descent from the best card, prevails, so as to make all the others in that hand good, and destroy all those in the other hand.—In like manner, a quart in one hand sets aside a tierce in the other.

The sequences over, they proceed to examine how many aces, kings, queens, knaves, and tens, each holds; reckoning for every three of any sort, three: but here too, as in sequences, he that with the same number of threes, has one that is higher than any the other has, *e. gr.* three aces, has all his others made good hereby, and his adversary's all set aside.—But four of any sort, which is called a *quatorze*, always sets aside three.

All the game in hand being thus reckoned, the el-

dest proceeds to play, reckoning one for every card he plays above a nine, and the other follows him in the suit; and the highest card of the suit wins the trick.—Note, unless a trick be won with a card above a nine (except the last trick), nothing is reckoned for it; though the trick serves afterwards towards winning the cards; and that he who plays last does not reckon for his cards, unless he wins the trick.

The cards being played out, he that has most tricks reckons ten for winning the cards.—If they have tricks alike, neither reckons any thing.—The deal being finished, and each having marked up his game, they proceed to deal again as before, cutting afresh each time for the deal.

If both parties be within a few points of being up, the *carte blanche* is the first thing that reckons, then the point, then the sequences, then the quatorzes or threes, then the tenth cards.

He that can reckon 30 in hand by *carte blanche*, points, quintes, &c. without playing, ere the other has reckoned any thing, reckons 90 for them; and this is called a *repique*.—If he reckons above 30, he reckons so many above 90. If he can make up 30, part in hand and part play, ere the other has told any thing, he reckons for them 60. And this is called a *pique*. Whence the name of the game.—He that wins all the tricks, instead of ten, which is his right for winning the cards, reckons 40. And this is called a *capot*.

PICRIS, *Ox-tongue*; a genus of the polygamia æqualis order, belonging to the syngenesia class of plants. There are four species, of which the only remarkable one is the echinoides, or common ox-tongue, growing spontaneously in corn-fields in Britain. It has undivided leaves embracing the stem, with yellow blossoms, which sometimes close soon after noon, at other times remain open till nine at night. It is an agreeable pot-herb while young. The juice is milky, but not too acid.

PICKLE, a brine or liquor, commonly composed of salt, vinegar, &c. sometimes with the addition of spices, wherein meat, fruit, and other things are preserved and seasoned.

PICTS, the name of one of those nations who anciently possessed the north of Britain. It is generally believed that they were so called from their custom of painting their bodies. But as this custom prevailed among the other ancient inhabitants of Britain, who used the *glajum* of Pliny and the *vitrum* of Mela for the like purpose, it may be asked, Why the name of *Picti* was confined by the Romans to only one tribe, when it was equally applicable to many others? Why should they design them only by an epithet without ever annexing their proper name? Or why should they impose a new name on this people only, when they give their proper name to every other tribe which they have occasion to speak of? As these questions cannot be answered in any satisfactory manner, it is plain we must look for some other derivation of the name.

The Highlanders of Scotland, who speak the ancient language of Caledonia, express the name of this once famous nation by the term *Pidlich*; a name familiar to the ears of the most illiterate, who could never have derived it from the Roman authors. The word *Pidlich* means *piraters* or *plunderers*. The appellation

Picris
Picts.

Name,

Picts. lation was probably imposed upon this people by their neighbours, or assumed by themselves, some time after the reign of Caracalla, when the unguarded state of the Roman province, on which this people bordered, gave them frequent opportunities of making incursions thither, and committing depredations. Accordingly this name seems to have been unknown till the end of the 3d century. Eumenius the Panegyrist is the first Roman author who mentions this people under their new name of *Picti*, or, with a Latin termination, *Picti*. When we say that this name may have been probably assumed for the reason just now mentioned, we must observe, that, in those days of violence, the character of a robber was attended with no disgrace. If he had the address to form his schemes well, and to execute them successfully, he was rather praised than blamed for his conduct; providing he made no encroachments on the property of his own tribe, or any of its allies. We mean this as no peculiar stigma upon the Picts; for other nations of antiquity, in the like rude state, thought and acted as they did. See *THUCYDIDES*, lib. 3. p. 3. and *VIRG. ÆN.* 7. 745 & 749.

Origin. Concerning the origin of the Picts, authors are much divided. Boethius derives them from the Agathyri, Pomponius Lætus from the Germans, Bede from the Scythians, Camden and father Innes from the ancient Britons, Stillingfleet from a people inhabiting the Chersonesus Cymbrica, and Keating and O'Flaherty, on the authority of the Pictish Castle, derive them from the Thracians. But the most probable opinion is, that they were the descendants of the old Caledonians. Several reasons are urged in support of this opinion by Dr Macpherson; and the words of Eumenius, "Caledonum, sive Pictorum, silvas, &c." plainly imply that the Picts and Caledonians were one and the same people.

Language. As there has been much dispute about the origin of the Picts, so there has been likewise about their language. There are many reasons which make it plain that their tongue was the Gaelic or Celtic; and these reasons are a further confirmation of their having been of Caledonian extract. Through the east and north-east coasts of Scotland (which were possessed by the Picts) we meet with an innumerable list of names of places, rivers, mountains, &c. which are manifestly Gaelic. From a very old register of the priory of St Andrews (Dalrymple's Collections, p. 122.) it appears, that in the days of Hungus, the last Pictish king of that name, St Andrew's was called *Mukros*; and that the town now called *Queensferry* had the name of *Ardechinnachan*. Both these words are plain Gaelic. The first signifies "the heath or promontory of boars;" and the latter, "the height or peninsula of Kenneth." In the list of Pictish kings published by father Innes, most of the names are obviously Gaelic, and in many instances the same with the names in the list of Scottish or Caledonian kings published by the same author. Had Innes understood any thing of this language, he would not have supposed with Camden that the Picts spoke the British tongue. It was unlucky that the two words on which they built their conjecture (*Strath* and *Aber*) are as common in the Gaelic as they could have been in the British, and at this day make a part of the names of places in countries to which the Pictish

empire never extended. The names of *Strathfillan* and *Lochaber* may serve as instances.

The venerable Bede, as much a stranger to the Celtic as either of the antiquaries just now mentioned, is equally unhappy in the specimen which he gives of the Pictish language in the word *penuabell*, "the head of the wall." Allowing the commutation of the initial *p* into *c*, as in some other cases, this word has still the same meaning in Gaelic, which Bede gives it in the Pictish. It is true, there might have been then, as well as now, a considerable difference between different dialects of the Celtic; and thus, perhaps, that pious author was led to discover five languages in Britain agreeably to the five books of *Moses*: A conceit from which the good man derived a great deal of harmless satisfaction.

The Picts of the earliest ages, as appears from the joint testimony of all writers who examined the subject, possessed only the east and north-east coast of Scotland. On one side, the ancient Drumalbin, or that ridge of mountains reaching from Lochlomond near Dunbarton to the frith of Taine, which separates the county of Sutherland from a part of Ross, was the boundary of the Pictish dominions. Accordingly we find in the life of Columba, that, in travelling to the palace of Brudius, king of the Picts, he travelled over Drumalbin, the *Dorsum Britannie* of Adamnan. On the other side, the territory of the Picts was bounded by the Roman province. After Britain was relinquished by the emperor Honorius, they and the Saxons by turns were masters of those countries which lie between the frith of Edinburgh and the river Tweed. We learn from Bede, that the Saxons were masters of Galloway when he finished his Ecclesiastical History. The Picts, however, made a conquest of that country soon after; so that, before the extinction of their monarchy, all the territories bounded on the one side by the Forth and Clyde, and on the other by the Tweed and Solway, fell into their hands.

History. The history of the Picts, as well as of all the other ancient inhabitants of Britain, is extremely dark. The Irish historians give us a long list of Pictish kings, who reigned over Pictavia for the space of eleven or thirteen centuries before the Christian æra. After them Innes, in his Critical Essay, gives us a list of above fifty, of whom no less than five held the sceptre, each for a whole century. It is probable that these writers had confounded the history of the Picts with that of their ancestors the old Caledonians. In any other view, their accounts of them are highly fabulous; and have been long ago confuted by Dr Macpherson of Slate, an antiquary of much learning and research. The Picts, as has been already observed, were probably not known by that name before the 2d or 3d century. Adamnan, abbot of Jona, is the first author that expressly mentions any Pictish king; and the oldest after him is Bede. We are informed by these two writers that St Columba converted Brudius king of the Picts to the Christian faith. Columba came into Britain in the year of the vulgar æra 565. Before that period we have no general record to ascertain so much as the name of any Pictish king. The history of *Drust* or *Drest*, who is said to have reigned over the Picts in the beginning of the fifth century, when St Ninian first preached the gospel to that

Pics.

that nation, has all the appearance of fiction. His having reigned a hundred years, and his putting an end to a hundred wars, are stories which exceed all the bounds of probability.

Brudius, the cotemporary of Columba, is the first Pictish king mentioned by any writer of authority. What figure his ancestors made, or who were his successors on the throne of Pictavia, cannot be ascertained. Bede informs us, that, during the reign of one of them, the Picts killed Egfred king of Northumberland in battle, and destroyed the greatest part of his army. The same author mentions another of their kings called *Naitan*, for whom he had a particular regard. It was to this *Naitan* that Ceolfred, abbot of Wiremouth, wrote his famous letter concerning Easter and the Tonsure; a letter in which Bede himself is supposed to have had a principal hand. Roger Hoveden and Simon of Durham mention two other Pictish kings *Onnust* and *Kinoth*, the first of whom died in 761, and the latter flourished about the 774, and gave an asylum to Alfred of Northumberland, who was much about that time expelled his kingdom. The accounts given by the Scots historians of several other Pictish kings cannot be depended on; nor are the stories told by the British historians, Geoffry of Monmouth and the author of the *Eulogium Britannie*, worthy of much greater credit.

In the ninth century the Pictish nation was totally subdued by the Scots in the reign of Kenneth Mac-Alpin. Since that time their name has been lost in that of the conquerors, with whom they were incorporated after this conquest; however, they seem to have been treated by the Scottish kings with great lenity, so that for some ages after they commanded a great deal of respect. The prior of Hogulstead, an old English historian, relates that they made a considerable figure in the army of *David* the Saint, in his disputes with *Stephen*, king of England. In a battle fought in the year 1136, by the English on one side, and the Scots and Picts on the other, the latter insisted on their hereditary right of leading the van of the Scots army, and were indulged in that request by the king.

The principal seat of the Pictish kings was at Abernethy. Brudius, however, as appears from the accounts given by Adamnan, in his life of Columba, had a palace at Inverness, which was probably near the extremity of his territory in that quarter; for, there is no good reason for believing, with Camden, that this king had an property in the Western Isles, or that he had made a gift of *Jona* to St Columba when he visited him in that place.

With respect to the manners and customs of the Picts, there is no reason to suppose they were any other than those of the old Caledonians and Scots, of which many particulars are related in the Greek and Roman writers who have occasion to speak of those nations.

Picts Wall, in antiquity, a wall begun by the emperor Adrian, on the northern bounds of England, to prevent the incursions of the Picts and Scots. It was first made only of turf strengthened with palisades, till the emperor Severus, coming into Britain in person, built it with solid stone. This wall, part of which still remains, begun at the entrance of the Sol-

way Frith in Cumberland, and running north-east extended to the German Ocean. See ADRIAN and SEVERUS.

PICTURE, a piece of painting, or a subject represented in colours, on wood, canvas, paper, or the like. See PAINTING.

PICUS, the WOODPECKER, in ornithology, a genus belonging to the order of pice. The beak is straight, and consists of many sides, and like a wedge at the point; the nostrils are covered with bristly feathers; the tongue is round like a worm, very long, and sharp at the point, which is beset with bristles bent backwards. There are 21 species, principally distinguished by their colour. The following are known in Britain, viz.

1. The viridis, or green woodpecker, weighs six ounces and a half. Its length is 13 inches, the breadth 20 and a half; the bill is dusky, triangular, and near two inches long: the crown of the head is crimson, spotted with black; the eyes are surrounded with black, and the males have a rich crimson mark beneath the blackness. The back, neck, and lesser coverts of the wings, are green: the rump, of a pale yellow. The whole of the under part of the body is of a very pale-green; and the thighs and vent are marked with dusky lines. The legs and feet are of a cinereous green. The tail consists of ten stiff feathers, whose ends are generally broken, as the bird rests on them in climbing: their tips are black; the rest of each is alternately barred with dusky and deep green. These birds feed entirely on insects; and their principal action is that of climbing up and down the bodies or boughs of trees: for the first purpose they are provided with a long slender tongue, armed with a sharp bony end barbed on each side, which by the means of a curious apparatus of muscles they can exert at pleasure, darting it to a great length into the clefts of the bark, transfixing and drawing out the insects that lurk there. They make their nests in the hollows of trees: in order therefore to force their way to those cavities, their bills are formed strong, very hard, and wedge-like at the end; Dr Derham observes, that a neat ridge runs along the top, as if an artist had designed it for strength and beauty. Yet it has not power to penetrate a sound tree: their perforation of any tree is a warning to the owner to throw it down. Their legs are short, but strong; their thighs very muscular: their toes disposed, two backwards, two forward: the feathers of the tail are very stiff, sharp-pointed, and bending downwards. The three first circumstances do admirably concur to enable them to run up and down the sides of trees with great security; and the strength of the tail supports them firmly when they continue long, in one place, either where they find plenty of food, or while they are forming an access to the interior part of the timber. This form of the tail makes their flight very awkward, as it inclines their body down, and forces them to fly with short and frequent jerks when they would ascend, or even keep in a line. This species feeds oftener on the ground than any other of the genus: all of them make their nests in the hollows of trees; and lay five or six eggs, of a beautiful semi-transparent white.

2. The major, or great spotted woodpecker, weighs

Picture,
Picus.

Picus.

two ounces three quarters; the length is nine inches; the breadth is 16. The bill is one and a quarter long, of a black horn colour. The irides are red. The forehead is of a pale buff colour; the crown of the head a glossy black; the hind-part marked with a rich deep crimson spot. The cheeks are white; bounded beneath by a black line that passes from the corner of the mouth and furrounds the hind-part of the head. The neck is encircled with a black colour. The throat and breast are of a yellowish white; the vent-feathers of a fine light crimson. The back, rump, and coverts of the tail, and lesser coverts of the wings, are black; the scapular feathers and coverts adjoining to them, are white. The quill-feathers are black, elegantly marked on each web with round white spots. The four middle feathers of the tail are black, the next tipped with dirty yellow; the bottoms of the two outermost, black; the upper parts, a dirty white. The exterior feathers marked on each web with two black spots; the next with two on the inner web, and only one on the other. The legs are of a lead colour. The female wants that beautiful crimson spot on the head; in other respects the colours of both agree. This species is much more uncommon than the preceding; and keeps altogether in the woods.

3. The medius, or middle-sized woodpecker, agrees with the preceding in colours and size, excepting that the crown of the head in this is of a rich crimson; the crown of the head in the male of the former, black; and the crimson is in form of a bar on the hind part. Birds thus marked have been shot in Lancashire and other parts of England; but Mr Pennant is doubtful whether they are varieties, or distinct species.

4. The minor, or least spotted woodpecker, scarce weighs an ounce: the length is six inches; the breadth eleven. The forehead is of a dirty white: the crown of the head (in the male) of a beautiful crimson: the cheeks and sides of the neck are white, bounded by a bed of black beneath the former. The hind part of the head and neck, and the coverts of the wings, are black: the back is barred with black and white: the scapulars and quill-feathers spotted with black and white: the four middle feathers of the tail are black; the others varied with black and white: the breast and belly are of a dirty white: the crown of the head (in the female) is white; the feet are of a lead colour. It has all the characters and actions of the greater kind, but is not so often met with.

PICUS (John), earl of Mirandula, a prodigy of parts and learning, was the youngest child of John Francis Picus, earl of Mirandula and Concordia; and was born in the year 1463. The progress that he made in letters was so extremely rapid, that it was matter of astonishment to see even a boy one of the first poets and orators of his age. After visiting the most famous universities of France and Italy, he went to Rome; where, in 1486, before he was 24 years of age, he published 900 propositions in logic, mathematics, physics, divinity, cabalistic learning, and magic, drawn not only from Greek and Latin, but even from Jewish and Arabian writers: subjoining to his advertisement, that, "if any philosopher or divine would come to Rome to dispute with him, upon any or all of them, he would defray the expences of his journey from the remotest corners of Italy." He

enjoyed, however, the honour of this disputatious challenge quietly, without danger to his credit; for envy procured some of his propositions to be charged with heresy, and he was forbid to dispute upon them. At the age of 28, he confined himself wholly to the study of the scriptures; and undertook to combat the Jews and Mahometans, as well as to confound judicial astrology; but in this intention his credit was also saved, tho' with the loss of his life, by his dying in 1494, in his 32d year. He was called the *phenix of his age*; and composed a great number of works, which have often been printed both separately and together.

PICUS (John Francis), prince of Mirandula, nephew of John Picus mentioned above, was born about the year 1469. He cultivated learning and the sciences after the example of his uncle; but he had a principality and dominions to superintend, which involved him in great troubles, and at last cost him his life. He was twice driven from his principality, and twice restored; and at last, in 1533, was, together with his eldest son Albert, assassinated in his own castle by his nephew Galeoti. He was a great lover of letters; and such of his works as were then composed, were inserted in the Straßburgh edition of his uncle's in 1504, and continued in future impressions, besides some others, which were never collected.

PIECE, in matters of money, signifies sometimes the same thing with species; and sometimes, by adding the value of the pieces, it is used to express such as have no other particular name. For the piece of eight, or piastre, see MONEY-Table.

PIECE, is also a kind of money of account, or rather a manner of accounting used among the negroes on the coast of Angola in Africa. See MONEY-Table.

PIECE, in heraldry, denotes an ordinary or charge. —The honourable pieces of the shield are the chief, fess, bend, pale, bar, cross, saltier, chevron, and in general all those which may take up one-third of the field, when alone, and in what manner soever it be. See HERALDRY.

PIECES, in the military art, include all sorts of great guns and mortars. Battering pieces are the larger sort of guns used at sieges for making the breaches; such are the 24-pounder and culverine, the one carrying a 24 and the other an 18 pound ball. Field-pieces are 12-pounders, demiculverines, 6-pounders, sackers, minions, and 3-pounders, which march with the army, and encamp always behind the second line, but in day of battle are in the front. —A soldier's firelock is likewise called his *piece*.

PIEDMONT, a country of Italy, with the title of a principality; bounded on the north by Vallois; on the east, by the duchy of Milan and the duchy of Monterrat; on the south, by the county of Nice and the territory of Genoa; and on the west, by Dauphiny and Savoy. It comprehends 11 small provinces, Piedmont Proper, the valleys between France and Italy, the valley of Saluz, the county of Nice, the marquise of Susa, the duchy of Aost, the Canavese, the lordship of Versail, the county of Aft, and the Langes. It was formerly a part of Lombardy; but now belongs to the king of Sardinia; and lies at the foot of the Alps, which separate France from Italy. It is 175 miles in length, and 40 in breadth. It contains many high mountains; among which there are rich and fruitful

Picus
Piedmont.

Pieria
||
Piepoudre.

ful valleys, as pleasant and populous as any part of Italy. In the mountains are mines of several kinds, and the forests afford a great deal of game. The Piedmontese have more sense than the Savoyards, but then they are not so sincere. They are generally strongly attached to the Roman Catholic religion; and carry on so great a trade in raw silk, that the English alone have purchased to the value of 200,000 pounds in a year. Besides this, they have corn, rice, wine, fruits, hemp, flax, and cattle. Their sovereign is the king of Sardinia; who generally resides at Turin, the capital of this country. The valleys between France and Italy are inhabited by the Vaudeuse, who are Protestants. Towards the end of the last century, the French king persuaded the duke of Savoy to drive them out of the country, in consequence of which 20,000 of them retired to Germany, England, and Holland; and yet they are not at all extirpated, tho' they are obliged to have a Roman Catholic church in every parish.

PIERIA (anc. geog.), a district of Macedonia, contained between the mouths of the rivers Ludias and Peneus; extended by Strabo beyond the Ludias, to the river Axios on the north, and on the south no farther than the Aliacmon, along the west side of the Sinus Thermaicus.—Another *Pieria* of Syria, the north part of Seleucia, or the *Antiochena*, situate on the Sinus Issicus, and lying next Cilicia to the north-west.

PIERIS (anc. geog.), a mountain which is thought to have given name to *Pieria* of Macedonia; taking its name from *Pierus* a poet, who was the first that sacrificed to the Muses, thence called *Pierides*, if credit may be given to an ancient scholiast on Javinal.

PIEPOUDRE (*Court of*), the lowest, and at the same time the most expeditious, court of justice known to the law of England. It is called *piepoudre*, (*curia pedis pulverizati*), from the dusty feet of the suitors; or, according to Sir Edward Coke, because justice is there done as speedily as dust can fall from the foot: Upon the same principle that justice among the Jews was administered in the gate of the city, that the proceedings might be the more speedy, as well as public. But the etymology given us by a learned modern writer is much more ingenious and satisfactory; it being derived, according to him, from *piéd puldreux*, “a pedlar,” in old French, and therefore signifying the court of such petty chapmen as resort to fairs or markets. It is a court of record, incident to every fair and market; of which the steward of him who owns or has the toll of the market, is the judge. It was instituted to administer justice for all commercial injuries done in that very fair or market, and not in any preceding one. So that the injury must be done, complained of, heard, and determined, within the compass of one and the same day, unless the fair continues longer. The court hath cognizance of all matters of contract that can possibly arise within the precinct of that fair or market; and the plaintiff must make oath that the cause of an action arose there. From this court a writ of error lies, in the nature of an appeal, to the courts at Westminster. The reason of its institution seems to have been, to do justice expeditiously among the variety of persons that resort from distant places to a fair or market; since it is probable, that no other inferior court might be able to

serve its process, or execute its judgments, on both or perhaps either of the parties; and therefore, unless this court had been erected, the complaint must necessarily have resorted even in the first instance to some superior judicature.

PIER, in building, denotes a mass of stone, &c. opposed by way of fortress to the force of the sea, or a great river, for the security of ships that lie at harbour in any haven.

PIERIDES, in fabulous history, the daughters of *Pierus* a Macedonian prince, presuming to dispute with the muses for the prize of poetry, were turned into magpies. The name of *Pierides* was also given to the muses, from mount *Pieris* in Thessaly, which was consecrated to them; or, according to others, from *Pierus*, a Thessalian poet, who was the first who sacrificed to them. See *PIERIS*.

PIERINO DEL VAGA, an eminent Italian painter, born of poor parents in Tuscany, about the year 1500. He was placed apprentice with a grocer in Florence, and got some instructions from the painters to whom he was sent with colours and pencils; but a painter named *Vaga* taking him to Rome, he was called *Del Vaga*, from living with him, his real name being *Buonacorsi*. He studied anatomy with the sciences necessary for his profession; and had somewhat of every thing that was good in his compositions. After Raphael's death, he joined with *Julio Romano* and *Francisco Penni* to finish the works in the Vatican which were left imperfect by their common master; and to confirm their friendship, married Penni's sister. He gained the highest reputation by his performances in the palace of prince *Doria* at Genoa: but the multiplicity of his business and the vivacity of his imagination, drained his spirits in the flower of his age; for he died in the year 1547.

PIETISTS, a religious sect sprung up among the Protestants of Germany, seeming to be a kind of mean between the Quakers of England, and the Quietists of the Romish church.

They despise all sorts of ecclesiastical polity, all school theology, and all forms and ceremonies, and give themselves up to contemplation and the mystic theology.

* *PIG*, in zoology. See *Sus*.

Guinea-Pig. See *Mus*.

Pig of Lead, the eighth part of a soldier, amounting to 250 pounds weight.

PIGEON, in ornithology. See *COLUMBA*.

Carrier-Pigeon. See *CARRIER*, and *COLUMBA*.

PIGMENTS, preparations used by painters, dyers, &c. to impart colours to bodies, or to imitate particular colours. See *COLOUR-Making*, and *DYEING*.

PI-HAHIROTH, (*Moses*); understood to be a mouth or narrow pass between two mountains, called *Chiroth*, or *Eiroth*, and lying not far from the bottom of the western coast of the Arabian gulf; before which mouth the children of Israel encamped, just before their entering the Red Sea, (*Wells*).

PIKE, in ichthyology. See *Esox*.

The pike never swims in shoals as most other fish do, but always lies alone; and is so bold and ravenous, that he will seize upon almost any thing less than himself. This fish breeds but once in a year, which is in March. It is found in almost all fresh waters; but is very dis-

Pice
||
Pike.

ferent in goodness, according to the nature of the places where it lives. The finest pike are those which feed in clear rivers; those in ponds and meres are inferior to these, and the worst of all are those of the fen ditches. They are very plentiful in these last places, where the water is foul and coloured; and their food, such as frogs and the like, very plentiful, but very coarse; so that they grow large, but are yellowish and high belled, and differ greatly from those which live in the clearer waters.

The fishermen have two principal ways of catching the pike; by the ledger, and by the walking-bait.

The ledger-bait is fixed in one certain place, and may continue while the angler is absent. This must be a live bait, a fish or frog; and among fish, the dace, roach, and gudgeon, are the best; of frogs, the only caution is to choose the largest and yellowest that can be met with. If the bait be a fish, the hook is to be stuck through the upper lip, and the line must be 14 yards at least in length; the other end of this is to be tied to a bough of a tree, or to a stick driven into the ground near the pike's haunt, and all the line wound round a forked stick, except about half a yard. The bait will by this means keep playing so much under water, and the pike will soon lay hold of it.

If the bait be a frog, then the arming wire of the hook should be put in at the mouth, and out at the side; and with a needle and some strong silk, the hinder-leg of one side is to be fastened by one stitch to the wire-arming of the hook. The pike will soon seize this, and must have line enough to give him leave to get to his haunt and poach the bait.

The trolling for pike is a pleasant method also of taking them: in this a dead bait serves, and none is so proper as a gudgeon.

This is to be pulled about in the water till the pike seizes it; and then it is to have line enough, and time to swallow it: the hook is small for this sport, and has a smooth piece of lead fixed at its end to sink the bait; and the line is very long, and runs through a ring at the end of the rod, which must not be too slender at top.

The art of feeding pike, so as to make them very fat, is the giving them eels; and without this it is not to be done under a very long time; otherwise perch, while small, and their prickly fins tender, are the best food for them. Bream put into a pike-pond are a very proper food: they will breed freely, and their young ones make excellent food for the pike, who will take care that they shall not increase over much. The numerous shoals of roaches and ruds, which are continually changing place, and often in floods get into the pike's quarters, are food for them for long time.

Pike, when used to be fed by hand, will come up to the very shore, and take the food that is given them out of the fingers of the feeder. It is wonderful to see with what courage they will do this, after a while practising; and it is a very diverting sight when there are several of them nearly of the same size, to see what striving and fighting there will be for the best bits when they are thrown in. The most convenient place is near the mouth of the pond, and where there is about half a yard depth of water; for, by that means, the offal of the feedings will all lie in one place, and the deep water will serve for a place to retire into and

rest in, and will be always clean and in order.

Carp will be fed in the same manner as pike; and though by nature a fish as remarkably shy and timorous as the pike is bold and fearless, yet by custom they will come to take their food out of the person's hand; and will, like the pike, quarrel among one another for the nicest bits.

PIKE, in war, an offensive weapon, consisting of a wooden shaft, 12 or 14 feet long, with a flat steel head, pointed, called the *spear*. This weapon was long in use among the infantry; but now the bayonet, which is fixed on the muzzle of the firelock, is substituted in its stead. It is still used by some of the officers of infantry, under the name of *sponton*.—The Macedonian phalanx was a battalion of pike-men.

PILASTER, in architecture. See there, n° 55.

PILCHARD, in ichthyology, a fish which has a general likeness to the herring, but differs in some particulars very essential. The body of the pilchard is less compressed than that of the herring, being thicker and rounder: the nose is shorter in proportion, and turns up: the under jaw is shorter. The back is more elevated; the belly less sharp: the dorsal fin of the pilchard is placed exactly in the centre of gravity, so that when taken up by it, the body preserves an equilibrium, whereas that of the herring dips at the head: The scales of the pilchard adhere very closely, whereas those of the herring very easily drop off. The pilchard is in general less than the herring; but it is fatter, or more full of oil.

The pilchard appears in vast shoals off the Cornish coasts about the middle of July, disappearing the beginning of winter, yet sometimes a few return again after Christmas. Their winter retreat is the same with that of the herring, and their motives for migrating the same. They affect, during summer, a warmer latitude; for they are not found in any quantities on any of our coasts except those of Cornwall, that is to say, from Fowey harbour to the Scilly isles, between which places the shoals keep shifting for some weeks. The approach of the pilchard is known by much the same signs as those that indicate the arrival of the herring. Persons, called in Cornwall *huers*, are placed on the cliffs, to point to the boats stationed off the land the course of the fish. By the 1st of James I. c. 23, fishermen are empowered to go on the grounds of others to hue, without being liable to actions of trespass, which before occasioned frequent lawsuits.

The emoluments that accrue to the inhabitants of that county are great, and are best expressed in the words of Dr W. Borlase, in his account of the Pilchard Fishery. "It employs a great number of men on the sea, training them thereby to naval affairs; employs men, women, and children, at land, in salting, pressing, washing, and cleaning, in making boats, nets, ropes, casks, and all the trades depending on their construction and sale. The poor is fed with the offals of the captures; the land with the refuse of the fish and salt; the merchant finds the gains of commission and honest commerce; the fisherman, the gains of the fish. Ships are often freighted hither with salt, and into foreign countries with the fish, carrying off at the same time part of our tin. The usual produce of the number of hogheads exported each year, for ten years, from 1747 to 1756 inclusive, from the

Pile. four ports of Fowy, Falmouth, Penzance, and St Ives, it appears that Fowy has exported yearly 1732 hogheads; Falmouth, 14,631 hogheads and two-thirds; Penzance and Mounts-Bay, 12,149 hogheads and one-third; St Ives, 1282 hogheads: in all amounting to 29,795 hogheads. Every hoghead for ten years last past, together with the bounty allowed for every hoghead exported, and the oil made out of each hoghead, has amounted, one year with another at an average, to the price of 1*l.* 13*s.* 3*d.*; so that the cash paid for pilchards exported *lias*, at a medium, annually amounted to the sum of 49,532*l.* 10*s.* The numbers that are taken at one shooting out of the nets, is amazingly great. Mr Pennant says, that Dr Borlase assured him, that on the 5th of October 1767, there were at one time inclosed in St Ives's Bay 7000 hogheads, each hoghead containing 35,000 fish, in all 245,000,000.

PILE, in heraldry, an ordinary in form of a wedge, contracting from the chief, and terminating in a point towards the bottom of the shield.

PILE, in antiquity, a pyramid built of wood, on which the bodies of the deceased were laid in order to be burnt.

PILE, in building, is used for a large stake rammed into the ground in the bottom of rivers, or in marshy land, for a foundation to build upon.

Pile is also used among architects for a mass of building.

PILE, in coinage, denotes a kind of puncheon, which, in the old way of coining with the hammer, contained the arms or other figure and inscription to be struck on the coin. See **COINAGE**.

Accordingly we still call the arms-side of a piece of money the *pile*, and the head the *cross*; because in ancient coin, a cross usually took the place of the head in ours.

Pile-Engine, a very curious machine invented by Mr Vauloue for driving the piles of Westminster bridge. It is represented Plate CCXLV. A is a great upright shaft or axle, on which are the great wheel B, and the drum C, turned by horses joined to the bars S, S. The wheel B turns the trundle X, on the top of whose axis is the fly O, which serves to regulate the motion, and also to act against the horses, and to keep them from falling when the heavy ram Q is discharged to drive the pile P down into the mud in the bottom of the river. The drum C is loose upon the shaft A, but is locked to the wheel B by the bolt Y. On this drum the great rope HH is wound; one end of the rope being fixed to the drum, and the other to the follower G, to which it is conveyed over the pulleys I and K. In the follower G is contained the tongs F, that takes hold of the ram Q by the staple R, for drawing it up. D is a spiral or fly fixed to the drum, on which is wound the small rope T that goes over the pulley U, under the pulley V, and is fastened to the top of the frame at 7. To the pulley-block V is hung the counterpoise W, which hinders the follower T from accelerating as it goes down to take hold of the ram; for as the follower tends to acquire velocity in its descent, the line T winds downwards upon the fly, on a larger and larger radius, by which means the counterpoise W acts stronger and stronger against it; and so allows it to come down with only a moderate and uniform velo-

city. The bolt Y locks the drum to the great wheel, being pushed upward by the small lever 2, which goes through a mortoise in the shaft A, turns upon a pin in the bar 3, fixed to the great wheel B, and has a weight 4, which always tends to push up the bolt Y through the wheel into the drum. L is the great lever turning on the axis m, and resting upon the forcing bar 5, 5, which goes through a hollow in the shaft A, and bears up the little lever 2.

By the horses going round, the great rope H is wound about the drum C, and the ram Q is drawn up by the tongs F in the follower G, until the tongs comes between the inclined planes E; which, by shutting the tongs at the top, opens it at the foot, and discharges the ram which falls down between the guides bb upon the pile P, and drives it by a few strokes as far into the mud as it will go; after which, the top part is sawed off close to the mud by an engine for that purpose. Immediately after the ram is discharged, the piece 6 upon the follower G takes hold of the ropes aa, which raise the end of the lever L, and cause its end N to descend and press down the forcing bar 5 upon the little lever 2, which, by pulling down the bolt Y, unlocks the drum C from the great wheel B; and then the follower being at liberty, comes down by its own weight to the ram; and the lower ends of the tongs slip over the staple R, and the weight of their heads causes them to fall outward, and shuts upon it. Then the weight 4 pushes up the bolt Y into the drum, which locks it to the great wheel, and so the ram is drawn up as before.

As the follower comes down it causes the drum to turn backward, and unwinds the rope from it, whilst the horses, great wheel, trundle and fly, go on with an uninterrupted motion; and as the drum is turning backward, the counterpoise W is drawn up, and its rope T wound upon the spiral fly D.

There are several holes in the under side of the drum, and the bolt Y always takes the first one that it finds when the drum stops by the falling of the follower upon the ram; until which stoppage the bolt has not time to slip into any of the holes.

This engine was placed upon a barge on the water, and so was easily conveyed to any place desired. The ram was a ton weight; and the guides bb, by which it was let fall, were 30 feet high.

PILES, in medicine, the same with hemorrhoids. See **MEDICINE**, n° 354, 358.

PILGRIM, one who travels through foreign countries to visit holy places, and to pay his devotion to the reliques of dead saints. See **PILGRIMAGE**.

The word is formed from the Flemish *pelgrim*, or Italian *pellegrino*, which signifies the same; and those originally from the Latin *peregrinus*, a "stranger or traveller."

PILGRIMAGE, a kind of religious discipline, which consists in taking a journey to some holy place, in order to adore the relics of some deceased saint. Pilgrimages began to be made about the middle ages of the church; but they were most in vogue after the end of the 11th century, when every one was for visiting places of devotion, not excepting kings and princes themselves; and even bishops made no difficulty of being absent from their churches on the same account.

The

Pilkington
1
Pillory.

The places most visited were Jerusalem, Rome, Compostella, and Tours; but the greatest numbers now resort to Loretto, in order to visit the chamber of the blessed virgin, in which she was born, and brought up her son Jesus till he was 12 years of age.

PILKINGTON (*Lætitia*), a famous poetical genius, the daughter of Dr Van Lewin, a physician of Dublin, where she was born in 1712. She was married very young to the rev. Matthew Pilkington, a poet also of no inconsiderable merit; and these two wits, as is often the case, lived very unhappily together. They were at length totally separated, on the husband accidentally discovering a gentleman in her bedchamber at two o'clock in the morning; a circumstance which she accounted for in a very unsatisfactory manner. The story is told at large in her Memoirs; where she says, "Lovers of learning, I am sure, will pardon me, as I solemnly declare it was the attractive charms of a new book, which the gentleman would not lend me, but consented to stay till I read it through, that was the sole motive of my detaining him." As there are not wanting some who form objections to the marrying learned wives, the chance of such literary appointments may perhaps be added to the list of them. After this unlucky adventure, Mrs Pilkington came to London; and having recourse to her pen for subsistence, through the means of Colley Cibber, she lived some time on the contributions of the great. She was however thrown into the Marshalsea for debt; and being set at liberty, opened a pamphlet shop. She raised at length a handsome subscription for her Memoirs; which are written with great sprightliness and wit, containing several entertaining anecdotes of Dean Swift, with whom she was intimate, at well as many pretty little pieces of her poetry. This ingenious but unhappy woman is said at last to have killed herself with drinking, at Dublin, in 1750.

PILL, in pharmacy, a form of medicine resembling a little ball, to be swallowed whole; invented for such as cannot take bitter and ill-tasted medicinal draughts; as also to keep in readiness for occasional use without decaying. See PHARMACY, n° 854, &c.

PILLAR, in architecture. See ARCHITECTURE, n° 38.

PILLAR, in the manege, is the centre of the ring, or manege-ground, round which a horse turns, whether there be a pillar in it or not. Besides this, there are pillars on the circumference or sides of the manege-ground, placed at certain distances, by two and two, from whence they are called the *two pillars*, to distinguish them from that of the centre. The use of the pillar in the centre, is for regulating the extent of ground, that the manege upon the volts may be performed with method and justness, and that they may work in a square, by rule and measure, upon the four lines of the volts; and also to break unruly high-mettled horses, without endangering the rider. The two pillars are placed at the distance of two or three paces one from the other, and the horse is put between those, to teach him to rise before, and yerk out behind, and put himself upon raised airs, &c. either by the aids, or chastisements.

PILLORY, (*collistrigium*, "collum stringens;" *pilloria*, from the French *pilleur*, i. e. *depeculator*, or *pelori*; derived from the Greek *πύλη*, *janua*, a "door,"

because one standing on the pillory puts his head as it were through a door; and *specus, video*), is an engine made of wood to punish offenders, by exposing them to public view, and rendering them infamous. There is a *statute of the pillory*, 51 Hen. III. And by statute it is appointed for bakers, forefellers, and those who use false weights, perjury, forgery, &c. 3 *Infi.* 219. Lords of leets are to have a pillory and tumbrel, or it will be the cause of forfeiture of the leet; and a will may be bound by prescription to provide a pillory, &c. 2 *Hawk.* P. C. 73.

PILOT, the officer who superintends the navigation, either upon the sea-coast or on the main ocean. It is, however, more particularly applied by our mariners to the person charged with the direction of a ship's course on or near the sea-coast, and into the roads, bays, rivers, havens, &c. within his respective district.

Pilots of ships, taking upon them to conduct any ship from Dover, &c. to any place up the river Thames, are to be first examined and approved by the master and wardens of the society of Trinity House, &c. or shall forfeit 10*l.* for the first offence, 20*l.* for the second, and 40*l.* for every other offence; one moiety to the informer, the other to the master and wardens; but any master or mate of a ship, may pilot his own vessel up the river: and if any ship be lost through the negligence of any pilot, he shall be for ever after disabled to act as a pilot. 3 Geo. I. c. 13. Also the Lord Warden of the Cinque Ports may make rules for government of pilots, and order a sufficient number to ply at sea to conduct ships up to the Thames: 7 Geo. I. c. 21. No person shall act as a pilot on the Thames, &c. (except in collier ships) without a licence from the master and wardens of Trinity House at Deptford, on pain of forfeiting 20*l.* And pilots are to be subject to the government of that corporation; and pay ancient dues, not exceeding 1*s.* in the pound, out of wages, for the use of the poor thereof. Stat. 5 Geo. II. c. 20.

By the laws of France, no person shall be received as pilot, till he has made several voyages, and passed a strict examination; and after that, on his return in long voyages, he is to lodge a copy of his journal in the admiralty: and if a pilot occasion the loss of a ship, he is to pay 100 *livres* fine, and to be for ever deprived of the exercise of pilotage; and if he doth it designedly, be punished with death. *Lex Mercat.* 70, 71.

The laws of Oleron ordain, That if any pilot designedly misguide a ship, that it may be cast away, he shall be put to a rigorous death, and hung in chains: and if the lord of a place, where a ship be thus lost, abet such villains in order to have a share of the wreck, he shall be apprehended, and all his goods forfeited for the satisfaction of the persons suffering; and his person shall be fastened to a stake in the midst of his own mansion, which, being fired on the four corners, shall be burned to the ground, and he with it. *Leg. Ol.* c. 25. And if the fault of a pilot be so notorious, that the ship's crew see an apparent wreck, they may lead him to the hatches, and strike off his head; but the common law denies this hasty execution: an ignorant pilot is sentenced to pass thrice under the ship's keel, by the laws of Denmark. *Lex Mercat.* 70.

The regulations, with regard to pilots in the royal navy, are as follow: The commanders of the king's ships, in order to give all reasonable encouragement to
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so useful a body of men as pilots, and to remove all their objections to his Majesty's service, are strictly charged to treat them with good usage, and an equal respect with warrant-officers.

"The purser of the ship is always to have a set of bedding provided on board for the pilots; and the captain is to order the boatswain to supply them with hammocks, and a convenient place to lie in, near their duty, and apart from the common men; which bedding and hammocks are to be returned when the pilots leave the ship.

"A pilot, when conducting one of his Majesty's ships in pilot-water, shall have the sole charge and command of the ship, and may give orders for steering, setting, trimming, or furling the sails; tacking the ship; or whatever concerns the navigation: and the captain is to take care that all the officers and crew obey his orders. But the captain is diligently to observe the conduct of the pilot; and if he judges him to behave so ill as to bring the ship into danger, he may remove him from the command and charge of the ship, and take such methods for her preservation as shall be judged necessary; remarking upon the log-book, the exact hour and time when the pilot was removed from his office, and the reasons assigned for it.

"Captains of the king's ships, employing pilots in foreign parts of his majesty's dominions, shall, after performance of the service, give a certificate thereof to the pilot, which being produced to the proper naval officer, he shall cause the same to be immediately paid; but if there be no naval-officer there, the captain of his majesty's ship shall pay him, and send the proper vouchers, with his bill, to the navy-board, in order to be paid as bills of exchange.

"Captains of his majesty's ships, employing foreign pilots to carry the ships they command into or out of foreign ports, shall pay them the rates due by the establishment or custom of the country, before they discharge them; whose receipts being duly vouched, and sent, with a certificate of the service performed, to the navy-board, they shall cause them to be paid with the same exactness as they do bills of exchange." *Regulations and Instructions of the Sea-Service, &c.*

PIMENTO, in botany, **JAMAICA PEPPER**, or **All-spice**. See **MYRTUS**, of which it is a species.

The fruits are gathered when green, and are exposed to the sun for many days on cloths, frequently shaking and turning them till they are thoroughly dry: great care is taken that they be not wetted by the morning and evening dews; and when thus dry, they are sent over to us.

Pimento abounds with a fragrant essential oil, which is separated in great quantity in distillation, and is so heavy that it sinks in water. This spice is much used in our foods, and sometimes in medicine: it is indeed a very good aromatic, and imitates the flavour of all the rest; so that the essential oil of Jamaica pepper is frequently substituted in the room of those drawn from the more costly spices.

PIMPINELLA, **BURNET SAXIFRAGE**; a genus of the digynia order, belonging to the pentandria class of plants. There are seven species; the most remarkable of which are, 1. The major, or greater burnet saxifrage, growing naturally in chalky woods, and on the sides of the banks near hedges, in several parts of

England. The lower leaves of this sort are winged; the lobes are deeply fawed on their edges, and sit close to the midrib, of a dark green. The stalks are more than a foot high, dividing into four or five branches. The lower part of the stalk is garnished with winged leaves, shaped like those at the bottom, but smaller: those upon the branches are short and trifid: the branches are terminated by small umbels of white flowers, which are composed of smaller umbels or rays. The flowers have five heart-shaped petals, which turn inward, and are succeeded by two narrow, oblong, channelled seeds. 2. The anifum, or common anise, is an annual plant, which grows naturally in Egypt; but is cultivated in Malta and Spain, from whence the seeds are annually imported into Britain. The lower leaves of this plant are divided into three lobes, which are deeply cut on their edges: the stalk rises a foot and a half high, dividing into several slender branches garnished with narrow leaves, cut into three or four narrow segments, terminated by pretty large loose umbels, composed of smaller umbels or rays, which stand on pretty long foot-stalks. The flowers are small, and of a yellowish white; the seeds are oblong and swelling.—The former species requires no culture; the latter is too tender to be cultivated for profit in this country. However, the seeds will come up if sown, in the beginning of April, upon a warm border. When they come up, they should be thinned, and kept clear of weeds; which is all the culture they require.

Uss. Both these spices are used in medicine. The roots of pimpinella have a grateful, warm, very pungent taste, which is entirely extracted by rectified spirit: in distillation the menstruum arises, leaving all that it had taken up from the root united into a pungent aromatic resin. This root promises, from its sensible qualities, to be a medicine of considerable utility, though little regarded in common practice: the only official composition in which it is an ingredient is the *pulvis ari compositus*. Stahl, Hoffman, and other German physicians, are extremely fond of it; and recommend it as an excellent stomachic, resolvent, detergent, diuretic, diaphoretic, and alexipharmac. They frequently gave it, and not without success, in scorbutic and cutaneous disorders, foulness of the blood and juices, tumours and obstructions of the glands, and diseases proceeding from a deficiency of the fluid secretions in general. Boerhaave directs the use of this medicine in asthmatic and hydropic cases, where the strongest resolvents are indicated: the form he prefers is a watery infusion; but the spirituous tincture possesses the virtues of the root in much greater perfection.

Aniseeds have an aromatic smell, and a pleasant warm taste, accompanied with a degree of sweetness. Water extracts very little of their flavour, rectified spirit the whole.

The seeds are in the number of the four greater hot seeds: their principal use is in cold stultid disorders, where tenacious phlegm abounds, and in the gripes to which young children are subject. Frederic Hoffman strongly recommends them in weakness of the stomach, diarrhoeas, and for strengthening the tone of the viscera in general; and thinks they well deserve the appellation given them by Helmont, *intestini*

Pin,
Pindar.

norum folamen. The smaller kind of anifeeds brought from Spain are preferred.

PIN, in commerce, a little necessary instrument, made of brads wire, chiefly used by women in adjusting their drefs.

The perfection of pins confifts in the ftiffnefs of the wire and its fmoothernefs, in the heads being well turned, and in the finenefs of the points. The London pointing and whitening are in moft repute; becaufe the pin-makers in that city, in pointing, ufe two steel mills; one of which forms the point, and the other takes of all irregularities, and renders it fmoother and as it were polished. In whitening, they ufe block-tin granulated; whereas in other countries they are faid to ufe a mixture of tin, lead, and quickfilver. The confumption of pins is incredible, and there is no commodity fold cheaper. The number of hands employed in this manufacture is very great, each pin paffing through the hands of fix different workmen, between the drawing of the brads wire and the fticking of the pin in the paper.

PIN (Lewis Ellies du), a very learned French writer, was born at Paris in 1657. In 1685 he undertook to publish an univerfal *bibliothèque* of all the ecclefiaftical writers, containing the hiftory of their lives, &c.; which vaft design he accordingly accomplifhed. The freedom our author ufed in his judgments on the ftyle, character, and doctrine of the ecclefiaftical writers, having difpleafed fome perfons, it was complained of to the archbifhop of Paris, who published a decree or *ordonnance* againft it. To this decree was annexed Mr du Pin's retraction; notwithstanding which, his work was fuppreffed by an arret of parliament. However, he continued it under another title. His many different books fhew his prodigious readinefs in compofing. He was at the fame time a divine, canonift, hiftorian, critic, and philofopher. At laft being exhaufted by his labours, and by a regimen which contributed to fhorten his days, he died in 1719.

PINDAR, the prince of lyric poets, was born at Thebes, about 520 years B. C. He received his firft musical inftructions from his father, who was a flute-player by profeflion; after which, according to Suidas, he was placed under Myrtis, a lady of diftinguifhed abilities in lyric poetry. It was during this period that he became acquainted with the poetefs Corinna, who was likewife a ftudent under Myrtis. Plutarch tells us, that Pindar profited from the leffons which Corinna, more advanced in her ftudies, gave him at this fchool. It is very natural to fuppofe, that the firft poetical effufions of a genius fo full of fire and imagination as that of Pindar would be wild and luxuriant; and Lucian has preferved fix verfes, faid to have been the exordium of his firft effay; in which he crowded almoft all the fubjects for fong which ancient hiftory and mythology then furnifhed. Upon communicating this attempt to Corinna, he told him, fmiling, that he fhould fow with the hand, and not empty his whole fack at once. Pindar, however, foon quitted the leading-strings of thefe ladies, his poetical nurfes, and became the difciple of

Simonides, now arrived at extreme old age; after which he foon furpaffed all his mailers, and acquired great reputation over all Greece: but, like a true prophet, he was lefs honoured in his own country than elfewhere; for at Thebes he was frequently pronounced to be vanquifhed, in the musical and poetical contefts, by candidates of inferior merit.

The cuftom of having thefe public trials of fkill in all the great cities of Greece was now fo prevalent, that but little fame was to be acquired by a musician or poet, any other way than by entering the lifts; and we find, that both Myrtis and Corinna publicly difputed the prize with him at Thebes. He obtained a victory over Myrtis, but, was vanquifhed five different times by Corinna. The judges, upon occafions like thefe, have been frequently accufed of partiality or ignorance, not only by the vanquifhed, but by pofterity: and if the merit of Pindar was pronounced inferior to that of Corinna five feveral times, it was, fays Pausanias, becaufe the judges were more fenfible to the charms of beauty than to thofe of mufic and poetry (A). Was it not ftrange, faid the Scythian Anacharifts, that the Grecian artists were never judged by artists, their peers?

Pindar, before he quitted Thebes, had the vexation to fee his Dithyrambics traduced, abufed, and turned into ridicule, by the comic poets of his time; and Athenæus tells us, that he was feverely cenfured by his brother lyrics, for being a lipogrammatift, and compofing an ode from which he had excommunicated the letter S. Whether thefe cenfures proceeded from envy, or contempt, cannot now be determined; but they were certainly ufeful to Pindar, and it was neceffary that he fhould be lashed for fuch puerilities. Thebes feems to have been the *purgatory* of our young bard; when he quitted that city, as his judgment was matured, he avoided moft of the errors for which he had been chaftifed, and fuddenly became the wonder and delight of all Greece. Every hero, prince, and potentate, defirous of lafting fame, courted the Mufe of Pindar.

He feems frequently to have been prefent at the four great feftivals, of the Olympian, Pythian, Nemean, and Iftmian games, as may be inferred from feveral circumftances and expreffions in the odes, which he compofed for the victors in them all. Thofe at Olympia, who were ambitious of having their achievements celebrated by Pindar, applied to him for an ode, which was firft fung in the Prytæneum, or town-hall of Olympia, where there was a banqueting room, fet apart for the entertainment of the conquerors. Here the ode was rehearfed by a chorus, accompanied by inftruments. It was afterwards performed in the fame manner at the triumphal entry of the victor into his own country, in proceffions, or at the facrifices that were made with great pomp and folemnity on the occafion.

Pindar, in his fecond Iftmian ode, has apologized for the mercenary cuftom among poets, of receiving money for their compofitions. "The world (fays he) is grown interefted, and thinks in general with the Spartan philofopher Ariftodemus, that *money only makes*

(A) Pausanias fays, that Corinna was one of the moft beautiful women of her time, as he judged by a picture of her, which he faw at Tanagra, in the place where the public exercifes were performed. She was reprefented with her head ornamented by a riband, as a memorial of the victories fhe had obtained over Pindar at Thebes.

Pindar.

makes the man : a truth which this sage himself experienced, having with his riches lost all his friends." It is supposed that Pindar here alludes to the avarice of Simonides, who first allowed his muse to sell her favours to the highest bidder.

There is no great poet in antiquity, whose moral character has been less censured than that of Pindar. Plutarch has preserved a single verse of his *Epicidium*, or *Dirge*, that was sung at his funeral; which, short and simple as it is, implies great praise: *This man was pleasing to strangers, and dear to his fellow-citizens. His works abound with precepts of the purest morality: and it does not appear that he ever traduced even his enemies; comforting himself, for their malignity, by a maxim which he inserted in his first Pythic, and which afterwards became proverbial, That it is better to be envied than pitied.*

Pausanias says, that the character of poet was truly consecrated, in the person of Pindar, by the God of verse himself, who was pleased, by an express oracle, to order the inhabitants of Delphos to set apart, for Pindar, one half of the first-fruit offerings brought by the religious to his shrine, and to allow him a conspicuous place in his temple; where, in an iron chair, he used to sit and sing his hymns in honour of that god. This chair was remaining in the time of Pausanias, several centuries after, and shown to him as a relic not unworthy of the sanctity and magnificence of that place.

But though Pindar's muse was pensioned at Delphos, and well paid by princes and potentates elsewhere, she seems, however, sometimes to have sung the spontaneous strains of pure friendship. Of this kind were, probably, the verses bestowed upon the musician Midas, of Agrigentum in Sicily, who had twice obtained the palm of victory by his performance on the flute at the Pythic games (a). It is in his 12th Pythic Ode, that Pindar celebrates the victory of Midas over all Greece, upon that instrument which Minerva herself had invented (c).

Fabrieus tells us, that Pindar lived to the age of 90; and, according to the chronology of Dr Blair, he died 435 years B. C. aged 86. His fellow-citizens erected a monument to him in the Hippodrome at Thebes, which was still subsisting in the time of Pausanias; and his renown was so great after his death, that his posterity derived very considerable honours and privileges from it. When Alexander the Great attacked the city of Thebes, he gave express orders to his soldiers to spare the house and family of Pindar. The Lacedæmonians had done the same before this period; for when they ravaged Bœotia and burned the capital, the following words were written upon the door of the poet: *Forbear to burn this house, it was the dwelling of Pindar.* Respect for the memory of this great poet continued so long, that, even in Plutarch's time, the best part of the sacred victim at the Theoxenian festival was appropriated to his descendants.

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(b) This Midas is a very different personage from his long-eared majesty of Phrygia, whose decision in favour of Pan had given such offence to Apollo; as is manifest, indeed, from his having been cotemporary with Pindar.

(c) The most extraordinary part of this musician's performance, that can be gathered from the scholiast upon Pindar, was his finishing the solo, without a reed or mouth-piece, which broke accidentally while he was playing. The legendary account given by the poet in this ode, of the occasion upon which the flute was invented by Minerva, is diverting: "It was (says he) to imitate the howling of the Gorgons, and the hissing of their snakes, which the goddess had heard when the head of Medusa (one of these three anti-graces) was cut off by Perseus."

PINDARIC ODE, in poetry, an ode formed in imitation of the manner of Pindar. See POETRY, n^o 59.—61.

PINDUS, (anc. geog.), not a single mountain, but a chain of mountains, inhabited by different people of Æpirus and Thessaly; separating Macedonia, Thessaly, and Æpirus: An extensive chain, having Macedonia to the north, the Perrhæbi to the west, the Dolopes to the south, and the mountain itself of Thessaly, (Strabo).

PINDUS, a Doric city of Ætolia, situate on the cognominal river, which falls into the Cephissus, (Strabo).

PINE, in botany. See PINUS.

PINE-Apple. See BROMELIA.

The method of raising pine-apples in this country by means of artificial heat has long been known: of late, however, some very considerable improvements have been made in this article. The leaves of the oak have been substituted to the more expensive bark; and by treating the pines with them, they are found to thrive as well, and to produce as good fruit, as in the other method; and of the proper way of managing these leaves for the rearing of exotic plants, an account is given under the article OAK-LEAVES. But the most considerable improvement is that mentioned in the 67th volume of the Philosophical Transactions, where a method is shown by William Bairstow, esq; of Devonshire, of raising these fruits in water. His account of this method is as follows.

"Before I enter into the particulars of raising pine-apples in water, it will be necessary to tell you that my hot-house is covered with the best crown-glass, which I apprehend gives more heat than the common sort of green glass generally used for hot-houses. In the front part of the house, and indeed any where in the lowest parts of it, the pine-apple plants will not thrive well in water. The way in which I treat them is as follows. I place a shelf near the highest part of the back wall, so that the pine-plants may stand without absolutely touching the glass, but as near it as can be: on this shelf I place pans full of water, about seven or eight inches deep; and in these pans I put the pine-apple plants, growing in the same pots of earth as they are generally planted in to be plunged into the bark-bed in the common way; that is, I put the pot of earth, with the pine-plant in it, in the pan-full of water, and as the water decreases I constantly fill up the pan. I place either plants in fruit, or young plants as soon as they are well rooted, in these pans of water, and find they thrive equally well: the fruit reared this way is always much larger, as well as better flavoured, than when ripened in the bark-bed. I have more than once put only the plants themselves without any earth, I mean after they had roots, into these pans of water, with only water sufficient to keep the roots always covered, and found them flourish beyond expectation. In my house, the shelf I mention is supported by irons from the top, and there is an intervening

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vening

Pindaric
Pine.

Pinna
||
Pinguicula.

vening space of about 10 inches between the back wall and the shelf. A neighbour of mine has placed a leaden cistern upon the top of the back flue, (in which, as it is in contact with the flue, the water is always warm when there is fire in the house), and finds his fruit excellent and large. My shelf does not touch the black flue, but is about a foot above it; and consequently the water is only warmed by the air in the house. Both these methods do well. The way I account for this success is, that the warm air always ascending to the part where this shelf is placed, as being the highest part of the house, keeps it much hotter than in any other part. The temperature at that place is, I believe, seldom less than what is indicated by the 73d degree of Fahrenheit's thermometer, and when the sun shines it is often at above 100; the water the plants grow in seems to enable them to bear the greatest heat, if sufficient air be allowed; and I often see the roots of the plants growing out of the holes in the bottom of the pot of earth, and shooting vigorously in the water.

"My hot-house (the dimensions of which it may be proper to know) is 60 feet long, and 11 feet wide, the flues included; six feet high in the front, and 11 feet at the back of the inside of the house. It is warmed by two fires. A leaden trough or cistern on the top of the back flue is preferable to my shelf, as in it the pine-plants grow much faster in the winter, the water being always warmed by the flue: of this I have seen the great benefit these last two months in my neighbourhood. It is not foreign to this purpose to mention, that, as a person was moving a large pine-plant from the hot-bed in my house last summer, which plant was just showing fruit, by some accident he broke off the plant just above the earth in which it grew, and there was no root whatever left to it: by way of experiment I took the plant, and fixed it upright in a pan of water (without any earth whatever) on the shelf; it there soon threw out roots, and bore a pine-apple that weighed upwards of two pounds."

PINEAL GLAND. See ANATOMY, n° 397, c.

PINGUICULA, BUTTERWORT; a genus of the monogynia order, belonging to the diandria class of plants. There are four species; of which the most remarkable is the vulgaris, or common butterwort, growing commonly on bogs or low moist grounds, in England and Scotland. Its leaves are covered with soft, upright pellucid prickles, secreting a glutinous liquor. The flowers are pale red, purple, or deep violet colour, and hairy within. If the fresh-gathered leaves of this plant are put into the strainer through which warm milk from the cow is poured, and the milk set by for a day or two to become acedent, it acquires a consistency and tenacity, and neither whey nor cream separate from it. In this state it is an extremely grateful food, and as such is used by the inhabitants of the north of Sweden. There is no further occasion to have recourse to the leaves; for half a spoonful of this prepared milk, mixed with fresh warm milk, will convert it to its own nature, and this again will change another quantity of fresh milk, and so on without end. The juice of the leaves kills lice; and the common people use it to cure the cracks or chops in cows' udders. The plant is generally supposed injurious to

sheep, by occasioning in them that disease called the rot. But from experiments made on purpose, and conducted with accuracy, it appears, that neither sheep, cows, goats, horses, or swine, will feed upon this plant.

PINION, in mechanics, an arbor, or spindle, in the body whereof are several notches, which catch the teeth of a wheel that serves to turn it round, or it is a lesser wheel that plays in the teeth of a larger.

PINK, a name given to a ship with a very narrow stern; whence all vessels, however small, whose sterns are fashioned in this manner, are called *pink-ferned*.

PINK, in botany. See DIANTHUS.

PINNA, in zoology, a genus belonging to the order of vermes testacea. The animal is a slug. The CCCLIII. shell is bivalve, fragile, and furnished with a beard; fig. 2. gapes at one end; the valves hinge without a tooth. The largest and most remarkable species inhabits the Mediterranean. It is blind, as are all of the genus; but furnished with very strong calcareous valves. The scuttle-fish (*Sepia*), an inhabitant of the same sea, is a deadly foe to this animal: As soon as the pinna opens its shell, he rushes upon her like a lion; and would always devour her, but for another animal whom she protects within her shell, and from whom in return she receives very important services. It is an animal of the crab kind, (see CANCER, n° 15.), naked like the hermit, and very quick-sighted. This cancer or crab the pinna receives into her covering; and when she opens her valves in quest of food, lets him out to look for prey. During this the scuttle-fish approaches; the crab returns with the utmost speed and anxiety to his hostess, who being thus warned of the danger shuts her doors, and keeps out the enemy. That very sagacious observer Dr Hasselquist, in his voyage towards Palestine, beheld this curious phenomenon, which tho' well known to the ancients had escaped the moderns. Aristotle (*Hist. lib. 5. c. 15.*) relates, that the pinna kept a guard to watch for her: That there grew to the mouth of the pinna a small animal, having claws, and serving as a caterer, which was like a crab, and was called the *pinnaephylax*. Pliny (lib. 9. 51.) says, The smallest of all the kinds is called the *pinnoteras*, and therefore liable to injury; this has the prudence to hide itself in the shells of oysters. Again, lib. 9. 66. he says, The pinna is of the genus of shell-fish; it is produced in muddy waters, always erect, nor ever without a companion, which some call the *pinnoteres*, others the *pinnaephylax*. This sometimes is a small squill, sometimes a crab, that follows the pinna for the sake of food. The pinna is blind; and when, upon opening its shell, it exposes itself as a prey to the smallest kind of fishes, these immediately assault her, and growing bolder upon finding no resistance venture in. The guard watching its time gives notice by a bite; upon which the pinna, closing its shell, shuts in, kills, and gives part of whatever happens to be there to its companion.

The pinna and the crab together dwell,

For mutual succour, in one common shell.

They both to gain a livelihood combine;

That takes the prey, when this has given the sign.

From hence this crab, above his fellows famed,

By ancient Greeks was *pinnoteres* nam'd.

OPPIAN.

PINNACE, a small vessel navigated with oars and sails,

Pinion
||
Pinnace.

Pinnace fails, and having generally two masts, which are rigged like those of a schooner.

Pinnace, is also a boat usually rowed with eight oars.

See the article **BOAT**.

PINNACLE, in architecture, the top or roof of an house, terminating in a point. This kind of roof among the ancients, was appropriated to temples; their ordinary roofs were all flat, or made in the platform way.

PINNATED LEAVES, in botany. See **BOTANY**, p. 1296. col. 2. n° 59.

PINT, (*pinta*), a vessel, or measure, used in estimating the quantity of liquids, and even sometimes of dry things.—Budeus derives the word from the Greek *πινδα*; others from the German *pint*, a little measure of wine; Nicod from the Greek *πινω*, “to drink.”

The *English pint* is twofold; the one for wine-measure, the other for beer and ale-measure. See **MEASURE**.—Two pints make a quart, two quarts a pottle, two pottles a gallon, &c. See **GALLON**, **QUART**, &c.

The *Scots pint* was formerly regulated by a standard jug of cast metal, the custody of which was committed to the borough of Stirling. This jug was supposed to contain 105 cubic inches; and though after several careful trials it has been found at a medium to contain only about 103½ inches, yet, in compliance with established custom, founded on that opinion, the pint-stoups are still regulated to contain 105 inches.—It was enacted by James I. of Scotland, that the pint should contain 41 ounces Trone-weight of the clear water of Tay, and by James VI. that it should contain 55 Scots Troy-ounces of the clear water of Leith. This affords another method of regulating the pint, and also ascertains the ancient standard of the Trone-weight. As the water of Tay and Leith are alike, the Trone-weight must have been to the Scots Troy-weight as 55 to 41; and therefore the pound Trone must have contained about 21½ ounces Scots Troy. See **TRONE**.—The Scots pint contains two chopins, the chopin two mutchkins, and the mutchkin four gills.—Two pints make a quart, and four pints a Scots gallon.

PINTADA, a species of **PROCELLARIA**.

PINTLES, certain pints or hooks, fastened upon the back part of the rudder, with their points downwards, in order to enter into, and rest upon, the *goings*, fixed in the stern-post, to hang the rudder. See **HELM**.

PINTURICCIO (Bernardino), a celebrated Italian painter, born at Perugia in 1454. He was the disciple of Peter Perugino, under whom he became so good an artist, that he employed him on many occasions as his assistant. He principally painted history and grotesque; but he also excelled in portraits, among which those of pope Pius II. and Innocent VIII. of Giulia Farnese, Cesar Borgia, and queen Isabella of Spain, are particularly distinguished. The most memorable performance of Pinturiccio is the history of Pius II. painted in ten compartments in the history of Siena; in which undertaking, Raphael, then a young man, and bred under the same master, assisted him so far as to sketch out cartoons of many parts of the composition. The story of his death is worth relating, especially as it illustrates his character. The last work

he was engaged in was a *Nativity* for the monastery of St Francis at Siena: the monks accommodated him with a chamber to work in, which they cleared of all the furniture, except one old trunk or chest that appeared too rotten to move; but Pinturiccio, naturally positive and peevish, inflicting on its being taken away, the monks, willing to gratify him, complied. It was no sooner stirred than one of the planks burbling, out tumbled 500 pieces of gold, which had been secreted there for many years. The monks were overjoyed at finding this treasure, and the painter proportionably mortified at losing his chance of the discovery by his indiscreet obstinacy: it affected his spirits so much that he survived but a few months, and it was generally looked on as the cause of his death.

PINUS, the **PINE-TREE**; a genus of the monadelphous order, belonging to the monœcia class of plants. There are 14 species; of which the most remarkable are, 1. The pinea, pineaster, or wild pine, grows naturally on the mountains in Italy and the south of France. This grows to the size of a large tree; the branches extend to a considerable distance; and while the trees are young, they are fully garnished with leaves, especially where they are not so close as to exclude the air from those within; but as they advance in age, the branches appear naked, and all those which are situated below become unfitly in a few years, for which reason they are now much less in esteem than formerly. 2. The rubra, commonly called the *Scots fir* or *pine*. It is common throughout Scotland, whence its name; though it is also found in most of the other countries of Europe. M. du Hamel, of the Royal Academy of Sciences, mentions his having received some seeds of it from St Domingo in the West Indies; and thence concludes, that it grows indifferently in the temperate, frigid, and torrid zones. The wood of this tree is the red or yellow deal, which is the most durable of any of the kinds yet known. The leaves of this tree are much shorter and broader than those of the former sort, of a greyish colour, growing two out of one sheath; the cones are small, pyramidal, and end in narrow points; they are of a light colour, and the seeds are small. 3. The *strobus*, Lord Weymouth's pine, or North American white pine. This grows sometimes to the height of 100 feet and upwards, and is highly valued on account of its beauty. The bark of the tree is very smooth and delicate, especially when young; the leaves are long and slender, five growing out of one sheath; the branches are pretty closely garnished with them, and thus make a fine appearance. The cones are long, slender, and very loose, opening with the first warmth of the spring; so that if they are not gathered in winter, the scales open and let out the seeds. The wood of this sort is esteemed for making masts for ships. In Queen Anne's time there was a law made for the preservation of these trees, and for the encouragement of their growth in America. Within these last 50 years they have been propagated in Britain in considerable plenty.

Culture. All the sorts of pines are propagated by seeds produced in hard woody cones. The way to get the seeds out of these cones is to lay them before a gentle fire, which will cause the cells to open, and then the seeds may be easily taken out. If the cones

Pinus. are kept entire, the seeds will remain good for some years; so that the surest way of preserving them is to let them remain in the cones till the time for sowing the seeds. If the cones are kept in a warm place in summer, they will open and emit the seeds; but if they are not exposed to the heat, they will remain close for a long time. The best season for sowing the pines is about the end of March. When the seeds are sown, the place should be covered with nets to keep off the birds; otherwise, when the plants begin to appear with the husk of the seed on the top of them, the birds will peck off the 'tops, and thus destroy them.

Ufer. From the first species is extracted the common turpentine, much used by farriers, and from which is drawn the oil of that name. A decoction of the nuts or seeds of this species in milk, or of the extremities of the branches pulled in spring, is said, with a proper regimen, to cure the most inveterate scurvy. The wood of this species is not valued; but that of the Scots pine is superior to any of the rest. It is observable of the Scots pine, that when planted in bogs, or in a moist soil, though the plants make great progress, yet the wood is white, soft, and little esteemed; but when planted in a dry soil, tho' the growth of the trees is there very slow, yet the wood is proportionably better. Few trees have been applied to more uses than this. The tallest and straightest are formed by nature for masts to our navy. The timber is resinous, durable, and applicable to numberless domestic purposes, such as flooring and wainscoting of rooms, making of beds, chests, tables, boxes, &c. From the trunk and branches of this, as well as most others of the pine tribe, tar and pitch is obtained. By incision, barras, Burgundy pitch, and turpentine, are acquired and prepared. The resinous roots are dug out of the ground in many parts of the Highlands, and, being divided into small splinters, are used by the inhabitants to burn instead of candles. At Loch-Broom, in Ross-shire, the fishermen make ropes of the inner bark; but hard necessity has taught the inhabitants of Sweden, Lapland, and Kamtschatka, to convert the same into bread. To effect this, they, in the Spring season, make choice of the tallest and fairest trees; then stripping off carefully the outer bark, they collect the soft, white, succulent interior bark, and dry it in the shade. When they have occasion to use it, they first toast it at the fire, then grind, and, after steeping the flour in warm water to take off the resinous taste, they make it into thin cakes, which are baked for use. On this strange food the poor inhabitants are sometimes constrained to live for a whole year; and, we are told, through custom, become at last even fond of it. Linnæus remarks, that this same bark-bread will fatten swine; and humanity obliges us to wish, that men might never be reduced to the necessity of robbing them of such a food. The interior bark, of which the above-mentioned bread is made, the Swedish boys frequently peel off the trees in the spring, and eat raw with greedy appetite. From the cones of this tree is prepared a diuretic oil, like the oil of turpentine, and a resinous extract, which has similar virtues with the balsam of Peru. An infusion or tea of the buds is highly commended as an antiscorbutic. The farina,

or yellow powder, of the male-flowers, is sometimes in the spring carried away by the winds, in such quantities, where the trees abound, as to alarm the ignorant with the notion of its raining brimstone. The tree lives to a great age; Linnæus affirms, to 400 years.

PIONEERS, in the art of war, are such as are commanded in from the country, to march with an army for mending the ways, for working on intrenchments and fortifications, and for making mines and approaches. The soldiers are likewise employed in all these things.—Most of the foreign regiments of artillery have half a company of pioneers, well instructed in that important branch of duty. Our regiments of infantry and cavalry have three or four pioneers well instructed in that important branch of duty. Our regiments of infantry and cavalry have three or four pioneers each, provided with aprons, hatchets, saws, spades, and pick-axes. Each pioneer must have an ax, a saw, and an apron; a cap with a leather crown, and a black bears-skin front, on which is to be the king's crest in white, on a red ground; also an ax and a saw. The number of the regiment to be on the back part of the cap.

PIP, or PEP, a disease among poultry, consisting of a white thin skin, or film, that grows under the tip of the tongue, and hinders their feeding. It usually arises from want of water, or from the drinking puddle-water, or eating filthy meat. It is cured by pulling off the film with the fingers, and rubbing the tongue with salt. Hawks are particularly liable to this disease, especially from feeding on stinking flesh.

PIPE, in building, &c. a canal, or conduit, for the conveyance of water and other liquids. Pipes for water, water-engines, &c. are usually of lead, iron, earth, or wood: the latter are usually made of oak or elder. Those of iron are cast in forges; their usual length is about two feet and a half: several of these are commonly fastened together by means of four screws at each end, with leather or old hat between them, to stop the water. Those of earth are made by the potters; these are fitted into one another, one end being always made wider than the other. To join them the clofer, and prevent their breaking, they are covered with tow and pitch: their length is usually about that of the iron pipes. The wooden pipes are trees bored with large iron augres, of different sizes, beginning with a less, and then proceeding with a larger successively; the first being pointed, the rest being formed like spoons, increasing in diameter, from one to six inches or more: they are fitted into the extremities of each other (as represented fig. 5.), and are sold by the foot.

Wooden pipes are bored as follows. The machine represented fig. 4. is put in motion by the wheel A, which is moved by a current of water; upon the axle of this wheel, is a cog-wheel B, which causes the lanterns C, D, to turn horizontally, whose common axis is consequently in a perpendicular direction. The lantern D turns at the same time two cog-wheels, E and F: the first, E, which is vertical, turns the augre which bores the wood; and the second, F, which is horizontal, causes the carriage bearing the piece to advance by means of the arms H, I, which takes hold of the notches in the wheel K. The first, H,

H, by means of the notches, draws the wheel towards F; and the other, **I**, pushes the under-post of the wheel in an opposite direction; both which motions tend to draw the carriage towards F, and consequently cause the augre to pierce the wood. The augre being from 9 to 12 feet in length, and of a proportionable bigness, it will be necessary to have two pieces, as **L**, **I**, to support its weight, and cause it to enter the piece to be bored with the same uniformity.

For the construction of leaden pipes, see the article **PLUMBERY**.

Air-Pipes. See **Air-Pipes**.

Pipes of an Organ. See **ORGAN**.

Bag-Pipe. See **BAG-Pipe**.

Tobacco-PIPE, a machine used in the smoking of tobacco, consisting of a long tube, made of earth or clay, having at one end a little case, or furnace, called the *bowl*, for the reception of the tobacco, the fumes whereof are drawn by the mouth through the other end. Tobacco-pipes are made of various fashions; long, short, plain, worked, white, varnished, unvarnished, and of various colours, &c. The Turks use pipes three or four feet long, made of rushes, or of wood bored, at the end whereof they fix a kind of a pot of baked earth, which serves as a bowl, and which they take off after smoking.

PIPE, also denotes a vessel or measure for wine, and things measured by wine-measure. See the article **MEASURE**.

PIPE, in mining, is where the ore runs forwards endwise in a hole, and doth not sink downwards or in a vein.

PIPE, *Pipa*, in law, is a roll in the exchequer, called also the *great roll*. See the next article.

PIPE-Office, is an office wherein a person called the *clerk of the pipe*, makes out leases of crown-lands, by warrant from the lord-treasurer, or commissioners of the treasury, or chancellor of the exchequer. The clerk of the pipe makes out also all accounts of sheriffs, &c. and gives the accountants their *quietus est*. To this office are brought all accounts which pass the remembrancer's office, and remain there, that if any stated debt be due from any person, the same may be drawn down into the great roll of the pipe: upon which the comptroller issues out a writ, called the *summons of the pipe*, for recovery thereof; and if there be no goods or chattels, the clerk then draws down the debts to the lord treasurer's remembrancer, to write estreats against their lands. All tallies which vouch the payment of any sum contained in such accounts, are examined and allowed by the chief secondary of the pipe. Besides the chief clerk in this office, there are eight attorneys, or sworn clerks, and a comptroller.

PIPE-Fish, in ichthyology. See **SYNGNATHUS**.

PIPER, in ichthyology. See **TRIGLA**.

PIPER, *Pepper*; a genus of the trigynia order, belonging to the diandria class of plants. There are 20 species, of which the most remarkable is the *seriboa*, with oval, heart-shaped, nerved leaves, and reflexed spikes. This is the plant which produces the pepper so much used in food. It is a shrub whose root is small, fibrous, and flexible; it rises into a stem, which requires a tree or a prop to support it. Its wood has the

same sort of knots as the vine; and when it is dry, it exactly resembles the vine-branch. The leaves, which have a strong smell and a pungent taste, are of an oval shape; but they diminish towards the extremity, and terminate in a point. From the flower-buds, which are white, and are sometimes placed in the middle and sometimes at the extremity of the branches, are produced small berries resembling those of the curant-tree. Each of these contains between 20 and 30 corns of pepper; they are commonly gathered in October, and exposed to the sun seven or eight days. The fruit, which was green at first, and afterwards red, when stripped of its covering assumes the appearance it has when we see it. The largest, heaviest, and least shrivelled, is the best.

The pepper-plant flourishes in the islands of Java, Sumatra, and Ceylon, and more particularly on the Malabar coast. It is not sown, but planted; and great nicety is required in the choice of the shoots. It produces no fruit till the end of three years; but bears so plentifully the three succeeding years, that some plants yield between six and seven pounds of pepper. The bark then begins to shrink; and the shrub declines so fast, that in 12 years time it ceases bearing.

The culture of pepper is not difficult: it is sufficient to plant it in a rich soil, and carefully to pull up the weeds that grow in great abundance round its roots, especially the three first years. As the sun is highly necessary to the growth of the pepper-plant, when it is ready to bear, the trees that support it must be lopped to prevent their shade from injuring the fruit. When the season is over, it is proper to crop the head of the plant. Without this precaution, there would be too much wood, and little fruit.

The pepper exported from Malabar, which was formerly entirely in the hands of the Portuguese, and is at present divided between the Dutch, British, and French, amounts to about 10,000,000 weight.

PIRÆUS PORTUS, (anc. geog.), a celebrated port to the west of Athens, consisting naturally of three harbours or basons, (Thucydides); which lay neglected, till Themistocles put the Athenians on making it a commodious port, (Nepos); the Phalerus a small port, and not far from the city, being what they used before that time, (Pausanias, Nepos). Piræus was originally a village of Attica, (Pausanias); an island, (Strabo); and though distant 40 stadia from Athens, was joined to it by two long walls, (Thucydides), and itself locked or walled round, (Nepos): A very commodious and safe harbour. The whole of its compass was 60 stadia, including the Munichia. Not far from the Piræus, stood the sepulchre of Themistocles; whither his friends conveyed his bones from Magnesia, into the Hither Asia, (Cicero, Plutarch, Pausanias). It is still at this day a famous port, much frequented, and called *Porto Leone*.

PIRACY, the crime of robbery and depredation upon the high seas.

By the ancient common law, piracy, if committed by a subject, was held to be a species of treason, being contrary to his natural allegiance; and by an alien, to be felony only: but now, since the statute of treasons, 25 Edw. III. c. 2. it is held to be only felony in a subject. Formerly it was only cognizable by the admiralty courts, which proceeded by the rules of the civil

Piper
Piracy.

Piracy,
Pirate.

civil law. But, it being inconsistent with the liberties of the nation, that any man's life should be taken away, unless by the judgment of his peers, or the common law of the land, the statute 28 Hen. VIII. c. 15. established a new jurisdiction for this purpose; which proceeds according to the course of the common law.

The offence of piracy, by common law, consists in committing those acts of robbery and depredation upon the high seas, which, if committed upon land, would have amounted to felony there. But, by statute, some other offences are made piracy also: as, by statute 11 & 12 W. III. c. 7. if any natural born subject commits any act of hostility upon the high seas, against others of his majesty's subjects, under colour of a commission from any foreign power; this, though it would only be an act of war in an alien, shall be construed piracy in a subject. And farther, any commander, or other seafaring person, betraying his trust, and running away with any ship, boat, ordnance, ammunition, or goods; or yielding them up voluntarily to a pirate; or conspiring to do these acts; or any person assaulting the commander of a vessel, to hinder him from fighting in defence of his ship; or confining him, or causing or endeavouring to cause a revolt on board; shall, for each of these offences, be adjudged a pirate, felon, and robber, and shall suffer death, whether he be principal, or merely accessory by setting forth such pirates, or abetting them before the fact, or receiving or concealing them or their goods after it. And the statute 4 Geo. I. c. 11. expressly excludes the principals from the benefit of clergy. By the statute 8 Geo. I. c. 24. the trading with known pirates, or furnishing them with ammunition, or fitting out any vessel for that purpose, or in any wise consulting, combining, confederating, or corresponding with them; or the forcibly boarding any merchant vessel, though without seizing or carrying her off, and destroying or throwing any of the goods overboard; shall be deemed piracy; and such accessories to piracy as are described by the statute of king William are declared to be principal pirates, and all pirates convicted by virtue of this act are made felons without benefit of clergy. By the same statutes also, (to encourage the defence of merchant vessels against pirates), the commanders or seamen wounded, and the widows of such seamen as are slain, in any piratical engagement, shall be entitled to a bounty to be divided among them, not exceeding one fiftieth part of the value of the cargo on board; and such wounded seamen shall be entitled to the pension of Greenwich hospital; which no other seamen are, except only such as have served in a ship of war. And if the commander shall behave cowardly, by not defending the ship, if she carries guns or arms; or shall discharge the mariners from fighting, so that the ship falls into the hands of pirates; such commander shall forfeit all his wages, and suffer six months imprisonment. Lastly, by statute 18 Geo. II. c. 30. any natural born subject or denizen, who in time of war shall commit hostilities at sea against any of his fellow-subjects, or shall assist an enemy on that element, is liable to be tried and convicted as a pirate.

PIRATE, (*αιρατης*, Gr.); a sea-robber, or an armed ship that roams the seas without any legal

commission, and seizes or plunders every vessel she meets indiscriminately, whether friends or enemies.

The colours usually displayed by pirates are said to be a black field, with a death's head, a battle-axe, and hour-glass. The last instrument is generally supposed to determine the time allowed to the prisoners, whom they take, to consider whether they will join the pirates in their felonious combination, or be put to death, which is often perpetrated in the most cruel manner.

Amongst the most celebrated pirates of the north is recorded Alvida, daughter of a king of the Goths named *Sypardus*. She embraced this occupation to deliver herself from the violence imposed on her inclination, by a marriage with Alf, son of Sigarus king of Denmark. She dressed herself as a man; and composed her band of rowers, and the rest of her crew, of a number of young women attired in the same manner. Amongst the first of her cruizes, she touched at a place where a company of pirates bewailed the death of their captain. The strangers were captivated with the agreeable manners of Alvida, and chose her for their chief. By this reinforcement she became so formidable upon the sea, that prince Alf came to engage her. She sustained his attacks for a considerable time; but, in a vigorous action, Alf boarded her vessel, and having killed the greatest part of her crew, seized the captain, namely herself; whom nevertheless he knew not, because the princess had a casque which covered her visage. Being master of her person, he removed the casque; and in spite of her disguise, instantly recognized her, and offered her his hand in wedlock.

PIRENE, (Pliny); a fountain sacred to the muses, springing below the top of the Acrocorinthus, a high and steep mountain which hangs over Corinth. Its waters were agreeable to drink, (Pausanias); extremely clear, (Strabo); very light (Athenaeus), and pale (Perrus); having relation either to the grief of Pirene, mother of Cenchrea, from whose tears this fountain arose, (Pausanias); or to the paleness brought on by the too eager pursuits of the muses.

PISA, a large town of Tuscany in Italy, situated on the river Arno, 52 miles from Florence. It was a famous republic, till subdued, first by the duke of Milan, and then by the Florentines in the year 1406. Before it lost its freedom, it is said to have contained near 150,000 inhabitants, but now it has not above 16,000 or 17,000. Its territory is very fruitful; abounding in corn, wine, and fruit, and fine cattle. The houses are well built, and the streets even, broad, and well paved; but in many places over-run with grass. The university is well endowed, and has able professors, but is not in a very flourishing condition. The exchange is a stately structure, but little frequented. The great duke's galleys are built, and commonly stationed here. This city is also the principal residence of the order of St Stephen, and the see of an archbishop. The cathedral, a large Gothic pile, contains a great number of excellent paintings and other curiosities. The echo of the Baptistry is said to exceed that near Milan, though the repetitions are not quite so distinct. Hard by the cathedral is the city burying ground, called *Il Campo Santo*; and in that the famous leaning tower, the inclination of which

Piracy
Pis.

which is so great, that a plumb-line let down from the top touches the ground at the distance of near 15 feet from the bottom. In the church della Spina, they pretend to have one of the thorns of the crown that was placed on our Saviour's head. The city for its defence has a moat, walls, a castle, fort, and citadel; the last of which is a modern work. The Arno is of a considerable breadth here, and has three bridges over it, one of them of marble: two leagues below the town, it falls into the sea. The physic garden is very spacious, contains a great number of plants, and is decorated with water-works: over the door leading into it are these words, *Hic Argus sed non Briareus effo*; i. e. Employ the eye of Argus, but not the hands of Briareus. The air is said to be unwholesome here in summer, on account of the neighbouring morasses. Many buffaloes are bred in the neighbouring country, and their flesh commonly eaten. A canal runs from this city to Leghorn; and between it and Lucca are hot baths.

PISCARY, in our ancient statutes, the liberty of fishing in another man's waters.

PISCES, in astronomy, the 12th sign or constellation of the zodiac.

PISCIDIA, a genus of the decandria order, belonging to the diadelphia class of plants. There are two species, viz. 1. The erythrina, or dog-wood tree. This grows plentifully in Jamaica, where it rises to the height of 25 feet or more; the stem is almost as large as a man's body, covered with a light-coloured smooth bark, and sending out several branches at the top without order; the leaves are about two inches long, winged, with oval lobes. The flowers are of the butterfly kind, and of a dirty white colour; they are succeeded by oblong pods, with four longitudinal wings, and jointed between the cells which contain the seeds. 2. The Carthaginienfis, with oblong oval leaves, is also a native of the West Indies. It differs from the former only in the shape and confidence of the leaves, which are more oblong and stiffer than the former; but in other respects they are very similar. Both species are easily propagated by seeds; but require artificial heat to preserve them in this country.—The negroes in the West Indies make use of the bark of the first species to intoxicate fish. When any number of gentlemen have an inclination to divert themselves with fishing, or, more properly speaking, with fish-hunting, they fend each of them a negro-slave to the woods, in order to fetch some of the bark of the dog-wood tree. This bark is next morning pounded very small with stones, put into old sacks, carried into rocky parts of the sea, steeped till thoroughly soaked with salt-water, and then well squeezed by the negroes to express the juice. This juice immediately colours the sea with a reddish hue; and, being of a poisonous nature, will in an hour's time make the fishes, such as groopers, rock-fish, old wives, Welchmen, &c. so drunk or intoxicated, as to swim on the surface of the water, quite heedless of the danger: the gentlemen then fend in their negroes, who pursue, both swimming and diving, the poor inebriated fishes, till they catch them with their hands; their masters mean time standing by, on high rocks, to see the pastime.

It is remarkable, that though this poison kills millions of the small fry, it has never been known to im-

part any bad quality to the fish which have been caught in consequence of the intoxication.

The wood of this tree, although pretty hard, is only fit for fuel; and even for this purpose the negroes very seldom, if ever, employ it, on account of its singular quality just mentioned. The bark is rough, brown, and thick; the tree sends forth a considerable number of branches, and is well clothed with leaves, which resemble those of the pea, are thick, cottony, and of a deep green. The bark used for the above-mentioned purpose is chiefly that of the roots.

PISCINA, in antiquity, a large basin in a public place or square, where the Roman youth learned to swim; and which was surrounded with a high wall, to prevent fish from being thrown into it.—This word is also used for a lavatory among the Turks, placed in the middle court of a mosque or temple, where the Mussulmen wash themselves before they offer their prayers.

PISISTRATUS, a famous general of the Athenians. He usurped the supreme power, and, in order to obtain it, was a cruel tyrant; but having gained it, he became a wise legislator, and an excellent governor. He died 327 B. C.

PISSEPHALUTUM, **EARTH-PITCH**; a fluid, opaque, mineral body, of a thick consistence, strong smell, readily inflammable, but leaving a residuum of greyish ashes after burning. It arises out of the cracks of the rocks, in several places in the island of Sumatra, and some other places in the East Indies, where it is much esteemed in paralytic disorders.

PISSELEUM INDICUM, *Barbadoes Tar*; a mineral fluid, of the nature of the thicker bitumens, and of all others the most approaching, in appearance, colour, and consistence, to the true pissaphalum, but differing from it in other respects. It is very frequent in many parts of America, where it is found trickling down the sides of mountains in large quantities, and sometimes floating on the surface of the waters. It has been greatly recommended internally in coughs, and other disorders of the breast and lungs.

PISTACIA, **TURPENTINE-TREE**, *Pistachia-nut* and *Mastic tree*; a genus of the pentandria order, belonging to the dioecia class of plants. There are nine species; of which the most remarkable are, 1. The cerebinthus, or pistachia-tree. This grows naturally in Arabia, Persia, and Syria, whence the nuts are annually brought to Europe. In those countries it grows to the height of 25 or 30 feet; the bark of the stem and old branches is of a dark russet colour, but that of the young branches is of a light brown. These are garnished with winged leaves, composed sometimes of two, at other times of three pair of lobes, terminated by an odd one: these lobes approach towards an oval shape, and their edges are turned backward; and these, when bruised, emit a smell similar to that of the shell of the nut. Some of these trees produce male, and others female flowers, and some have both male and female on the same tree. The male flowers come out from the sides of the branches, in loose bunches or catkins. They have no petals, but five small stamina crowned by large four-cornered summits filled with farina; and when this is discharged, the flowers fall off. The female flowers come out in clusters from the sides of the branches: they have no petals, but a large oval germen supporting three reflexed styles, and are succeeded by oval nuts.

Pistacia
Pisum.

nuts. 2. The lentiscus, or common mastic-tree, grows naturally in Portugal, Spain, and Italy. Being an evergreen, it has been preserved in this country in order to adorn the green-houses. In the countries where it is a native, it rises to the height of 18 or 20 feet, covered with a grey bark on the stem; but the branches, which are very numerous, are covered with a reddish-brown bark, and are garnished with winged leaves, composed of three or four pair of small spear-shaped lobes, without an odd one at the end. 3. The orientalis, or true mastic-tree of the Levant, from which the mastic is gathered, has been confounded by most botanical writers with the lentiscus, or common mastic-tree, above described, though there are considerable differences between them. The bark of the tree is brown; the leaves are composed of two or three pair of spear-shaped lobes, terminated by an odd one: the outer lobes are the largest; the others gradually diminish, the innermost being the least. These turn of a brownish colour towards the autumn, when the plants are exposed to the open air; but if they are under glasses, they keep green. The leaves continue all the year; but are not so thick as those of the common sort, nor are the plants so hardy.

Culture. The first species is propagated by its nuts; which should be planted in pots filled with light kitchen-garden earth, and plunged into a moderate hot-bed to bring up the plants: when these appear, they should have a large share of air admitted to them, and by degrees they should be exposed to the open air, which at last they will bear in all seasons, though not without great danger of being destroyed in severe winters. The second sort is commonly propagated by laying down the branches, though it may also be raised from the seed in the manner already directed for the pistachia-nut tree: And in this manner also may the true mastic-tree be raised; but this, being more tender than any of the other sorts, requires to be constantly sheltered in winter, and to have a warm situation in summer.

Uses. Pistachia nuts abound with a sweet and well-tasted oil, which they yield in great abundance on being pressed after bruising them: they are reckoned wholesome and nutritive; and are very proper to be prescribed by way of restoratives, eaten in small quantity, to people emaciated by long illness.

PISTIL, among botanists, the little upright column which is generally found in the centre of every flower. According to the Linnæan system, it is the female part of generation, whose office is to receive and secrete the pollen, and produce the fruit. It consists of three parts, viz. germen, stylus, and stigma.

PISTOL, the smallest piece of fire-arms, borne at the saddle-bow, on the girdle, and in the pocket.

PISTOLE, a gold coin, struck in Spain, and in several parts of Italy, Switzerland, &c.—The pistole has its augmentations and diminutions, which are quadruple pistoles, double pistoles, and half pistoles. See MONEY-Table.

PISTON, in pump-work, is a short cylinder of metal or other solid substance, fitted exactly to the cavity of the barrel or body of the pump. See HYDROSTATICS, &c. v.

PISUM, PEASE; a genus of the decandria order, belonging to the diadelphia class of plants. The species are, 1. The sativum, or greater garden-pea, whose

lower stipulæ are roundish, indented, with taper foot-stalks and many flowers on a foot-stalk. 2. The humile, or dwarf pea, with an erect branching stalk, and leaves having two pair of round lobes. 3. The umbellatum, rose, or crown-pea, with four-pointed acute stipulæ, and foot-stalks bearing many flowers, which terminate the stalks. 4. The maritimum, or sea-pea, with foot-stalks which are plain on their upper side, an angular stalk, arrow-pointed stipulæ, and foot-stalks bearing many flowers. 5. The Americanum, commonly called Cape-Horn pea, with an angular trailing stalk, whose lower leaves are spear-shaped, sharply indented, and those at the top arrow-pointed. 6. The ochrus, with membranaceous running foot-stalks, having two leaves and one flower upon a foot-stalk.

There is a great variety of garden pease now cultivated in Britain, which are distinguished by the gardeners and seedsmen, and have their different titles; but as great part of these have been feminal variations, so if they are not very carefully managed, by taking away all those plants which have a tendency to alter before the seeds are formed, they will degenerate into their original state: therefore all those persons who are curious in the choice of their seeds, look carefully over those which they design for seeds at the time when they begin to flower, and draw out all the plants which they dislike from the other. This is what they call *regulating their peases*; meaning hereby, the taking out all the bad plants from the good, that the farina of the former may not impregnate the latter; to prevent which, they always do it before the flowers open. By thus diligently drawing out the bad, reserving those which come earliest to flower, they have greatly improved their pease of late years, and are constantly endeavouring to get forwarder varieties; so that it would be to little purpose in this place, to attempt giving a particular account of all the varieties now cultivated: therefore we shall only mention their titles by which they are commonly known; placing them according to their time of coming to the table, or gathering for use.

The golden hotspur.	Nonpareil.
The Charlton.	Sugar dwarf.
The Reading hotspur.	Sickle pea.
Master's hotspur.	Marrowfat.
Essex hotspur.	Rose or crown pea.
The dwarf pea.	Rouncival pea.
The fugar pea.	Gray pea.
Spanish Morotto.	Pig pea; with some others.

The English sea-pea is found wild upon the shore in Sussex and several other counties in England, and is undoubtedly a different species from the common pea.

The fifth species hath a biennial root, which continues two years. This was brought from Cape Horn by Lord Anson's cook, when he passed that Cape, where these pease were a great relief to the sailors. It is kept here as a curiosity, but the pease are not so good for eating as the worst sort now cultivated in Britain. It is a low trailing plant: the leaves have two lobes on each foot-stalk: those below are spear-shaped, and sharply indented on their edges; but the upper leaves are small, and arrow-pointed. The flowers are blue, each foot-stalk sustaining four or five flowers; the pods are taper, near three inches long; and the seeds are round, about the size of tares.

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The sixth sort is annual. This grows naturally among the corn in Sicily and some parts of Italy, but is here preferred in botanic gardens for the sake of variety. It hath an angular stalk rising near three feet high; the leaves stand upon winged foot-stalks, each sustaining two oblong lobes. The flowers are of a pale yellow colour, shaped like those of the other sort of pea, but are small, each foot-stalk sustaining one flower; these are succeeded by pods about two inches long, containing five or six roundish seeds, which are a little compressed on their sides. These are by some persons eaten green; but unless they are gathered very young, they are coarse, and at best not so good as the common pea. It may be sown and managed in the same way as the garden pea.

We shall now proceed to set down the method of cultivating the several sorts of garden pease, so as to continue them throughout the season.

It is a common practice with the gardeners near London, to raise pease upon hot-beds, to have them very early in the spring; in order to which, they sow their pease upon warm borders, under walls or hedges, about the middle of October; and when the plants come up, they draw the earth up gently to their stems with a hoe, the better to protect them from frost. In these places they let them remain until the latter end of January, or the beginning of February, observing to earth them up from time to time as the plants advance in height (for the reasons before given); as also to cover them in very hard frost with pease-haulm, straw, or some other light covering, to preserve them from being destroyed; then, at the time before-mentioned, they make a hot-bed (in proportion to the quantity of pease intended), which must be made of good hot dung, well prepared and properly mixed together, that the heat may not be too great. The dung should be laid for two or three feet thick, according as the beds are made earlier or later in the season; when the dung is equally levelled, then the earth (which should be light and fresh, but not over rich), must be laid thereon about six or eight inches thick, laying it equally all over the bed. This being done, the frames (which should be two feet high on the back side, and about 14 inches in front), must be put on, and covered with glasses; after which, it should remain three or four days, to let the steam of the bed pass off before you put the plants therein, observing every day to raise the glasses, to give vent for the rising steam to pass off; then, when you find the bed of a moderate temperature for heat, you should, with a trowel, or some other instrument, take up the plants as carefully as possible to preserve the earth to their roots, and plant them into the hot-bed in rows about two feet asunder, and the plants about an inch distant from each other in the rows, observing to water and shade them until they have taken root; after which you must be careful to give them air at all times when the season is favourable, otherwise they will draw up very weak, and be subject to grow mouldy and decay. You should also draw the earth up to the flanks of the plants as they advance in height, and keep them always clear from weeds. The water they should have must be given them sparingly; for if they are too much watered, it will cause them to grow too rank, and sometimes rot off the plants at their flanks just above ground. When

the weather is very hot, you should cover the glasses with mats in the heat of the day, to screen them from the violence of the heat of the sun, which is then too great for them: but when the plants begin to fruit, they should be watered oftener, and in greater plenty than before; for by that time the plants will have nearly done growing, and the often refreshing them will occasion their producing a greater plenty of fruit.

The sort of pea which is generally used for this purpose, is the dwarf; for all the other sorts ramble too much to be kept in frames: the reason for sowing them in the common ground, and afterwards transplanting them on a hot-bed, is to check their growth, and cause them to bear in less compass; for if the seeds were sown upon a hot-bed, and the plants continued thereon, they would produce such luxuriant plants as could not be contained in the frames, and would bear but little fruit.

The next sort of pea, which is sown to succeed those on the hot-bed, is the hotspur, of which there are reckoned several varieties, as the golden hotspur, the Charlton hotspur, the Masters's hotspur, the Reading hotspur, and some others; which are very little differing from each other, except in their early bearing, for which the golden and Charlton hotspurs are chiefly preferred; though if either of these sorts are cultivated in the same place for three or four years, they are apt to degenerate, and be later in fruiting; for which reason, most curious persons procure their seeds annually from some distant place; and in the choice of these seeds, if they could be obtained from a colder situation and a poorer soil than that in which they are to be sown, it will be much better than on the contrary, and they will come earlier in the spring.

These must also be sown on warm borders, toward the latter end of October; and when the plants are come up, you should draw the earth up to their flanks and treat them in every other respect as above directed.

In the spring you must carefully clear them from weeds, and draw some fresh earth up to their stems; but do not raise it too high up to the plants, lest by burying their leaves you should rot their stems, as is sometimes the case, especially in wet seasons. You should also observe to keep them free from vermin, which, if permitted to remain amongst the plants, will increase so plentifully as to devour the greatest part of them. The chief of the vermin which infect pease are slugs, which lie all the day in the small hollows of the earth, near the stems of the plants, and in the night-time come out and make terrible destruction of the pease; and these chiefly abound in wet soils, or where a garden is neglected and over-run with weeds: therefore you should make the ground clear every way round the pease to destroy their harbours; and afterwards in a fine mild morning very early, when these vermin are got abroad from their holes, you should shake a quantity of lime, which should be strewn over the ground pretty thick, which will destroy the vermin wherever it happens to fall upon them, but will do very little injury to the pease, provided it be not scattered too thick upon them.

If this crop of pease succeeds, it will immediately follow those on the hot-bed; but for fear this should miscarry, it will be proper to sow two more crops at

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Pisum, about a fortnight or three weeks distance from each other, so that there may be the more chances to succeed. This will be sufficient till the spring of the year, when you may sow several more crops of these pease at a fortnight distance from each other. The late sowings will be sufficient to continue the early sort of pease through the season, but it will be proper to have some of the large sort to succeed them for the use of the family; in order to which, you should sow some of the Spanish Morotto, which is a great bearer and a hardy sort of pea, about the middle of February, upon a clear open foot of ground. These must be sown in rows about four feet asunder, and the pease should be dropped in the drills about an inch distance, covering them about two inches deep with earth, being very careful that none of them lie uncovered, which will draw the mice, pigeons, or rooks, to attack the whole spot; and it often happens, by this neglect, that a whole plantation is devoured by these creatures; whereas, when there are none of the pease left in sight, they do not easily find them out.

About a fortnight after this you should sow another spot, either of this sort or any other large sort of pea, to succeed those; and then continue to repeat sowing once a fortnight, till the middle or latter end of May; only observing to allow the marrowfats, and other very large sorts of pease, at least four feet and a half between row and row; and the rose-pea should be allowed at least eight or ten inches distance plant from plant in the rows; for these grow very large, and if they have not room allowed them, they will spoil each other by drawing them up very tall, and will produce no fruit.

When the plants come up, the earth should be drawn up to their flanks (as was before directed), and the ground kept entirely clear from weeds; and when the plants are grown eight or ten inches high, you should stick some brushwood into the ground close to the pease for them to ramp upon, which will support them from trailing upon the ground, which is very apt to rot the growing sorts of pease, especially in wet seasons; besides, by thus supporting them, the air can freely pass between them, which will preserve the blossoms from falling off before their time, and occasion them to bear much better than if permitted to lie upon the ground, and there will be room to pass between the rows to gather the pease when they are ripe.

The dwarf sorts of pease may be sown much closer together than those before-mentioned; for these seldom rise above a foot high, and rarely spread above half a foot in width, so that these need not have more room than two feet row from row, and not above an inch asunder in the rows. These will produce a good quantity of pease, provided the season be not over-dry; but they seldom continue long in bearing, so that they are not so proper to sow for the main crop when a quantity of pease is expected for the table, their chief excellency being for hot-beds, where they will produce a greater quantity of pease (provided they are well managed) than if exposed to the open air, where the heat of the sun soon dries them up.

The large growing sorts may be cultivated for the common use of the family, because these will produce in greater quantities than the other, and will endure the drought better; but the early kind are by far the sweeter-tailed pease.

The best of all the large kinds is the marrowfat, which, if gathered young, is a well-tasted pea; and this will continue good through the month of August, if planted on a strong soil.

The gray and other large winter-pease are seldom cultivated in gardens, because they require a great deal of room, but are usually sown in fields. For the proper method of managing them, see AGRICULTURE, n^o 124.

PITCAIRNE (Dr Archibald), a most eminent physician and ingenious poet, was descended from the ancient family of the Pitcairnes of Pitcairne in Fifeshire, and was born at Edinburgh on the 25th of December 1652. He commenced his studies at the school of Dalkeith; and from thence he was removed to the university of Edinburgh, where he improved himself in classical learning, and completed a regular course of philosophy. His friends, according to the authors of the *Biographia Britannica*, were desirous that he should follow the profession of theology. The unpleasant gloom, however, which at that time hung over religion and its professors in Scotland, could not but very ill suit with that native cheerfulness of temper and liberality of mind which made him, long after, a mark for the arrows of preciseness and grimace. The law seems to have been his own choice, and to this science he turned his attention. With an ardour peculiar to himself, and an ambition to excel in whatever he undertook, he pursued it with so much intenseness, that his health began to be impaired. On this account, his physicians advised him to set out for the south of France. By the time he reached Paris, he was happily so far recovered, that he determined to renew his studies; but being informed that there was no able professor of law in that city, and finding several gentlemen of his acquaintance engaged in the study of physics, he went with them to the lectures and hospitals, and employed himself in this manner for several months, till his affairs called him home.

On his return, he applied himself chiefly to the mathematics. It is not usual to see the briars of this science and the flowers of poetry growing in the same soil. Here, however, they were happily united; and to this union perhaps was owing that singular command of judgment, over one of the liveliest of fancies, which appears in every part of his works. His intimacy with Dr David Gregory, the celebrated mathematical professor, began about the same time; and probably conduced to cherish his natural aptitude for this study. It was then, in a great measure, new to him; it soon became his principal delight; his progress in it was rapid, and correspondent to his progress in other pursuits. His improvements on the method of infinite series then adopted, which Dr Wallis of Oxford afterwards published, were a conspicuous and early proof of his abilities in this science.

Had Dr Pitcairne continued to prosecute the study of the law, and could he have moulded his principles to the times, the first offices and honours of the state might have been looked for without presumption as the probable reward of such talents as he possessed. Struck, however, with the charms of mathematical truth which had been lately introduced into the philosophy of medicine, and hoping to reduce the healing art to geometrical method, he unalterably determined

on this left aspiring profession. At the period when he formed this resolution, the ideas of the medical world, already sufficiently confused, were still farther jumbled by the discovery of the circulation of the blood, which had as yet produced nothing but doubt, uncertainty, and astonishment. In Edinburgh at that time there was no school, no hospital, no opportunity of improvement but the chamber and the shop. He therefore soon after returned to Paris. Genius and industry are unhappily not often united in the same character: of such an union Dr Pitcairne is a celebrated instance. During his residence in France, he cultivated the object of his pursuit with his natural enthusiasm, and with a steadiness from which he could not be diverted by the allurements of that joy, which, in his hours of social and festive intercourse, he always felt and always gave. Among his various occupations, the study of the ancient physicians seems to have had a principal share. This appears from a treatise which he published some time after his return; and it shows, that he wisely determined to know the progress of medicine from its earliest periods, before he attempted to reform and improve that science.

On the 13th of August 1680, he received, from the faculty of Rheims, the degree of Doctor; which, on the 7th of August 1699, was likewise conferred on him by the university of Aberdeen; both being attended with marks of peculiar distinction. Other medical honours are said to have been conferred on him in France and elsewhere; but nothing affords a more unequivocal testimony to his abilities than that which the surgeons of Edinburgh gave, in admitting him, freely and unsolicited, a member of their college. None had such opportunities of judging of his merit as a practitioner, and on no physician did they ever bestow the same public mark of respect. Soon after his graduation at Rheims, he returned to Edinburgh; where, on the 29th of November 1681, the Royal College of Physicians was instituted; and his name, among others, graced the original patent from the Crown.

In his *Solutio problematis de inventioribus*, the treatise above alluded to, he discovers a wonderful degree of medical literature, and makes use of it in a manner that does great honour both to his head and his heart. His object is to vindicate Dr Harvey's claim to the discovery of the circulation of the blood. The discovery was, at first, controverted by envy, and repudiated by ignorance. When at length its truth was fully established, many individually attempted to tear the laurels from the illustrious Englishman, and to plant them on the brows of Hippocrates and others. Had the attempt been directed against himself, the generous soul of Pitcairne could not have exerted more zeal in a defence; and his arguments remain unanswered.

During his residence in Scotland, his reputation became so considerable, that, in the year 1691, the university of Leyden solicited him to fill the medical

chair, at that time vacant. Such an honourable testimony of respect, from a foreign nation, and from such a university, cannot perhaps be produced in the medical biography of Great Britain. The lustre of such characters reflects honour on their profession, and on the country which has the good fortune of giving them birth; and serves to give the individuals of that country not only a useful elimation in their own eyes, but in those also of the rest of the world. Dr Pitcairne's well-known political principles excluded him from public honours and promotion at home: he therefore accepted the invitation from abroad; and, on the 26th of April 1692, delivered, at Leyden, his elegant and masterly inaugural oration: *Oratio qua ostenditur medicinam ab omni philosophorum secta esse liberam*. In this he clears medicine from the rubbish of the old philosophy; separates it from the influence of the different sects; places it on the broad and only sure foundation of experience; shows how little good inquiries into the manner how medicines operate have done to the art; and demonstrates the necessity of a tedious attention to their effects, and to the various appearances of disease.

Nothing (says an elegant panegyrist * of our author) Dr Ch. marks a superiority of intellect so much as the courage requisite to stem a torrent of oblatinately prevailing and groundless opinions. For this the genius and talents of Pitcairne were admirably adapted; and, in his oration, he displays them to the utmost. It was received with the highest commendations; and the administrators, to testify their sense of such an acquisition to their university, greatly augmented the ordinary appointment of his chair.

He discharged the duties of his office at Leyden so as to answer the most sanguine expectations. He taught with a perspicuity and eloquence which met with universal applause. Independently of the encomiums of Boerhaave and Mead, who were his pupils, the numerous manuscript copies of his lectures, and the mutilated specimen of them † which found its way into the world without his knowledge, show how justly it was bestowed. At the same time, he was not more celebrated as a professor than as a practical physician; and notwithstanding the multiplicity of his business in both these characters, he found leisure to publish several treatises on the circulation and some other of the most important parts of the animal economy (A).

At the close of the session, he set out for Scotland, with an intention of returning in time for the succeeding one. On his marrying (a) the daughter of Sir Archibald Stevenson, the object of his journey, her relations would on no account consent to part with him again. He was therefore reluctantly obliged to remain; and he wrote the university a polite apology, which was received with the utmost regret. He even declined the most flattering solicitations and tempting offers to settle in London. Indeed he soon came into that extensive practice to which his abilities en-
34 X 2 titled

(A) Dr Boerhaave gives the following character of these and some other of Dr Pitcairne's dissertations, which were collected and published at Rotterdam, anno 1701: "Hæc scripta optima sunt et perfecta, five legas Dissertationem de Motu Sanguinis per Pulmones, five alia opuscula, five ultimum tractatum de Opio." *Methodus studiij, ab Hallero edita*, p. 569.

(a) He had been married before to a daughter of Colonel James Hay of Pitfour, by whom he had a son and daughter, who both died young.

* Elementa
Medicine.

† Dr Ch. Webber, in the *Harveian Oration* at Edinburgh for the year 1791; from which performance the present article is chiefly extracted.

Pitcairne, titled him, and was also appointed titular professor of medicine in the university of Edinburgh.

The uniformity of a professional life is seldom interrupted by incidents worthy of record. Specimens, however, of that brilliant wit with which he delighted his friends in the hours of his leisure, continue to entertain us (c); and the effects of that eminent skill which he exerted in the cure of disease, still operate to the good of posterity.

The discovery of the circulation, while in some measure it exploded the chemical and Galenic doctrines, tended to introduce mathematical and mechanical reasoning in their stead. Of this theory (p) Dr Pitcairne was the principal support, and the first who introduced it into Britain. A mathematical turn of mind, and a wish for mathematical certainty in medicine, biased him in its favour, and he pushed it to its utmost extent. One is at a loss whether most to admire or regret such a waste of talents in propping a theory, which, though subversive of former ones, was to fall before others but a little more satisfactory than itself. Mechanical physicians expected more from geometry than that science could grant. They made it the foundation instead of an auxiliary to their inquiries, and applied it to parts of nature not admitting mathematical calculations. By paying more attention afterwards to the supreme influence of the living principle, the source of all the motions and functions of the body, it was found that these could not be explained by any laws of chemistry or mechanism. They are still, however, involved in

obscurity; and, notwithstanding the numberless improvements which have taken place in the sciences connected with medicine, will perhaps remain inscrutable while man continues in his present stage of existence.

In a science so slowly progressive as that of medicine, Dr Pitcairne did a great deal. By labouring in vain for truth in one road, he saved many the same drudgery, and thereby shewed the necessity of another. He not only exploded many false notions of the chemists and Galenists, which prevailed in his time, but many of those too of his own sect. In particular, he shewed the absurdity of referring all diseases and their cures to an alkali or an acid (e). He refuted the idea of secretion being performed by pores differently shaped (r), Bellini's opinion of effluences in the animal-spirits with the blood, and Borelli's of air entering the blood by respiration (s). He proved the continuity of the arteries and veins (h); and seems to have been the first who shewed that the blood flows from a smaller capacity into a larger, that the aorta, with respect to the arterial system, is the apex of a cone (i). In this therefore he may be considered as the latent spring of the discoveries respecting the powers moving the blood. He introduced a simplicity of prescription, unknown in pharmacy before his time (x); and such was the state of medicine in this country, that scarcely have the works of any contemporary or preceding author been thought worthy even of preservation (L). As to the errors of his philosophy, let it be remembered, that no theory has as yet stood the test

(c) Vide *Pitcairni Poemata*.—Several of his poems, however, are obscure, and some of them totally unintelligible without a key. In those of them which are of a political kind, he wished not to express himself too clearly; and in others, he alludes to private occurrences which were not known beyond the circle of his companions. His poem (*ad Lindseyum*), addressed to his friend Lindsey, is commented on by the authors of the *Biographia Britannica*; and it is to be regretted that it is the only one on which they have been solicitous to throw light. "Some parts (say they) of this poem are hardly intelligible, without knowing a circumstance in the Doctor's life, which he often told, and never without some commotion. It is a well-known story of the two Platonic philosophers, who promised one another, that which ever died first should make a visit to his surviving companion. This story being read together by Mr Lindsey and our author, they, being both then very young, entered into the same engagement. Soon after, Pitcairne, at his father's house in Fife, dreamed one morning, that Lindsey, who was then at Paris, came to him, and told him he was not dead, as was commonly reported, but still alive, and lived in a very agreeable place, to which he could not yet carry him. By the course of the poet, news came of Lindsey's death, which happened very suddenly the morning of the dream. When this is known, the poem is easily understood, and shines with no common degree of beauty.

"Lyndesi I Stygias jam dudum veste per undas,

"Stagna que Cocytus non adeunda mihi;

"Excute paulisper Lethæi vincula fœni;

"Ut feriant animum carmina nostra tuum.

"Te nobis, te redde tuis, promissa daturus

"Gaudia; fed proavo sis comitante redux;

"Namque novos viros mutataque regna videbis,

"Passaque Teutonicas sceptrâ Britanna manus *.

[* Written in 1689.]

"He then proceeds to exclaim against the principles and practices which produced this Teutonic violence upon the British sceptre; and concludes with a wish, that Lindsey might bring Radamantus with him to punish them.

"Unus abest scelus vindex Radamanthus; amice,

"Dil faciant reditus sit comes ille tui!

"Every one sees how much keener an edge is given to the satire upon the Revolution, by making it an additional reason for his friend's keeping his promise to return him a visit after his death."

(d) See the article *MEDICINE*, n° 99.—Borelli, Bellini, &c. espoused the same.

(e) *Pitcairni Dissertationes*, Edin, edit. 1713. De opera quam præstant corpora acida vel alkalica in curatione morborum.

(f) De circulatione sanguinis per vasa minima.

(g) De diversa mole qua sanguis fluit per pulmones.

(h) De circulatione sanguinis per vasa minima.

(i) De circulatione sanguinis in animalibus genitis et non genitis.

(k) *Elementa Medicinæ*, lib. i. cap. 21. et passim.

(L) The first medical publication which distinguished this country, after Dr Pitcairne's, was that of the *Edinburgh Medical Essays*, in the year 1732. Vid. the article *MONRO*.

Pitchaine ||
Pitching. test of many years in an enlightened period. His own hung very loosely about him (m), and the present generally received practice differs from his very little in reality. He treated inflammatory and hæmorrhagic diseases by bleeding, purging, and blistering, as has been done uniformly and solely on the different theories since. His method of administering mercury and the bark is observed at this day; and with respect to febrile, nervous, glandular, and dropical affections, they seem to be as often the opprobriums of the art now, as they were then.

Dr Pitcairne was universally considered as the first physician of his time. No one appears ever to have had so much practice in this country, or so many consultations from abroad; and no one, from all accounts, ever practised with greater sagacity and success. The highest thought themselves honoured by his acquaintance, and the lowest were never denied his assistance and advice. The emoluments of his profession must have been great; but his charities are known to have been correspondent. The possession of money he postponed to more liberal objects: he collected one of the finest private libraries in the world; which was purchased, after his death, by the Czar of Muscovy. Notwithstanding the fatigues he underwent in the exercise of his profession, his constitution was naturally delicate. About the beginning of October 1713, he became affected with his last illness; and on the 23d he died, regretted by science as its ornament, by his country as its boast, and by humanity as its friend. He left a son and four daughters; of whom only one of the latter now survives. The present noble family of Kelly are his grandchildren.

Some anonymous publications are attributed to Dr Pitcairne, particularly a treatise *De Legibus Historiæ Naturalis*, &c.; but the only ones he thought proper to legitimate are his *Dissertationes Medice*, and a short essay *De Salute*.

PITCH, a tenacious oily substance, drawn chiefly from pines and firs, and used in shipping, medicine, and various arts: or it is more properly tar inspissated by boiling it over a slow fire. See **TAR**.

PITCHING, in sea-affairs, may be defined, the vertical vibration which the length of a ship makes about her centre of gravity; or the movement by which she plunges her head and after part alternately into the hollow of the sea. This motion may proceed from two causes: the waves, which agitate the vessel; and the wind upon the sails, which makes her lurch to every blast thereof. The first absolutely depends upon the agitation of the sea, and is not susceptible of inquiry; and the second is occasioned by the inclination of the masts, and may be submitted to certain established maxims.

When the wind acts upon the sails, the mast yields to its effort, with an inclination, which increases in proportion to the length of the mast, to the augmentation of the wind, and to the comparative weight and distribution of the ship's lading.

The repulsion of the water, to the effort of gravity, opposes itself to this inclination, or at least sustains it, by as much as the repulsion exceeds the momentum,

or absolute effort of the mast, upon which the wind operates. At the end of each blast, when the wind suspends its action, this repulsion lifts the vessel; and these successive inclinations and repulsions produce the movement of pitching, which is very inconvenient; and, when it is considerable, will greatly retard the course, as well as endanger the mast, and strain the vessel.

PITH, in vegetation, the soft spongy substance contained in the central parts of plants and trees *.

* See *Plant*.

PITISCUS (Samuel), a learned antiquary, born at Zutphen, was rector of the college of that city, and afterwards of St Jerome at Utrecht, where he died on the 18th of February 1717, aged ninety. He wrote, 1. *Lexicon Antiquitatum Romanorum*, in two volumes folio; a work which is esteemed. 2. Editions of many Latin authors, with notes; and other works.

PITS (John), the biographer, was born in 1560, at Aulton in Hampshire; and educated at Wykeham's school, near Winchester, till he was about 18 years of age; when he was sent to New-college in Oxford, and admitted probationer fellow. Having continued in that university not quite two years, he left the kingdom as a voluntary Romish exile, and retired to Doway; thence he went to the English college at Rheims, where he remained about a year; and then proceeded to Rome, where he continued a member of the English college near seven years, and was made a priest. In 1589 he returned to Rheims; and there, during two years, taught rhetoric and the Greek language. He now quitted Rheims, on account of the civil war in France; and retired to Pont à Mousson in Loraine, where he took the degrees of master of arts and bachelor in divinity. Hence he travelled into Germany; and resided a year and a half at Triers, where he commenced licentiate in his faculty. From Triers he visited several of the principal cities in Germany; and continuing three years at Ingolstadt in Bavaria, took the degree of doctor in divinity. Thence having made the tour of Italy, he returned once more to Loraine; where he was patronised by the cardinal of that duchy, who preferred him to a canonry of Verdun; and about two years after, he became confessor to the duchess of Cleves, daughter to the duke of Loraine. During the leisure he enjoyed in this employment, he wrote in Latin the lives of the kings, bishops, apostolical men, and writers of England. The last of these, commonly known and quoted by this title, *De illustribus Angliæ scriptoribus*, was published after his death. The three first remain still in manuscript, among the archives of the collegiate church of Liverdon. The duke of Cleves dying, after Pits had been about twelve years confessor to the duchess, he returned to Loraine, attended by our author, who was promoted to the deanery of Liverdon, which, with a canonry and officialship, he enjoyed to the end of his life. He died in 1616, and was buried in the collegiate church. Pits was undoubtedly a scholar, and not an inelegant writer; but he is justly accused of ingratitude to Bale, from whom he borrowed his materials, without acknowledgment. He quotes Le-

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(m) Patet, *says he*, medicinam esse memoriam eorum quæ cuilibet morbo usus ostendit fuisse utilis. Nam notas non esse corporum intra venas fluentium aut consentientium naturas, adeoque sola observatione inutiliter quid cuique morbo conveniat, postquam sepius eadem eadem morbo profuisse comperimus. *De Div. Morb.*

Pitt. land with great familiarity, without ever having seen his book: his errors are innumerable, and his partiality to the Romish writers most obvious; nevertheless we are obliged to him for his account of several popish authors, who lived abroad at the beginning of the Reformation.

PITT (Christopher), an eminent English poet, celebrated for his excellent translation of Virgil's *Æneid*, was born in the year 1699. Having studied four years at New-college, Oxford, he was presented to the living of Pimperne in Dorsetshire, which he held during the remainder of his life. He had so poetical a turn, that while he was a school-boy he wrote two large folios of manuscript poems, one of which contained an entire translation of Lucan. He was much esteemed while at the university; particularly by the celebrated Dr Young, who used familiarly to call him his *son*. Next to his fine translation of Virgil, Mr Pitt gained the greatest reputation by his excellent English translation of Vida's art of poetry. This amiable poet died in the year 1648, without leaving, it is said, one enemy behind him.

PITT (William) earl of Chatham, a most celebrated British statesman and patriot, was born in November 1708. He was the youngest son of Robert Pitt, Esq; of Boconnock in Cornwall; and grandson of Thomas Pitt, Esq; governor of Fort St George in the East Indies, in the reign of queen Anne, who sold an extraordinary fine diamond to the king of France for 135,000*l*. and thus obtained the name of *Diamond Pitt*. His intellectual faculties and powers of elocution very soon made a distinguished appearance; but, at the age of 16, he felt the attacks of an hereditary and incurable gout, by which he was tormented at times during the rest of his life.

His lordship entered early into the army, and served in a regiment of dragoons. Through the interest of the duchess of Marlborough, he obtained a seat in parliament before he was 21 years of age. His first appearance in the house was as representative of the borough of Old Sarum, in the ninth parliament of Great Britain. In the 10th he represented Seaford, Aldborough in the 11th, and the city of Bath in the 12th; where he continued till he was called up to the house of peers in 1766. The intention of the duchess in bringing him thus early into parliament was to oppose Sir Robert Walpole, and whom he kept in awe by the force of his eloquence. At her death the duchess left him 10,000*l*. on condition, as was then reported, that he should never receive a place in administration. However, if any such condition was made, it certainly was not kept on his Lordship's part. In 1746 he was appointed vice-treasurer of Ireland, and soon after paymaster general of the forces, and sworn a privy-counsellor. He discharged the office of paymaster with such honour and inflexible integrity, refusing even many of the perquisites of his office, that his bitterest enemies could lay nothing to his charge, and he soon became the darling of the people. In 1755 he resigned the office of paymaster, on seeing Mr Fox preferred to him. The people were alarmed at this resignation; and being disgusted with the unsuccessful beginning of the war, complained so loudly, that, on the 4th December 1756, Mr Pitt was appointed secretary of state in the room of Mr Fox afterwards Lord

Holland; and other promotions were made in order to second his plans. He then took such measures as were necessary for the honour and interest of the nation; but in the month of February 1757, having refused to assent to the carrying on a war in Germany for the sake of his majesty's dominions on the continent, he was deprived of the seals on the 5th of April following. Upon this the complaints of the people again became so violent, that on the 29th of June he was again appointed secretary, and his friends to other important offices. The success with which the war was now conducted is universally known; yet on the 5th of October 1761, Mr Pitt, to the astonishment of almost the whole kingdom, resigned the seals into his majesty's own hands. The reason of this was, that Mr Pitt, having received certain intelligence that the family-compact was signed between France and Spain, and that the latter was about to join France against us, thought it necessary to prevent her by commencing hostilities first. Having communicated this opinion in the privy-council, the other ministers urged that they would think twice before they declared war against this kingdom. "I will not give them leave to think," (replied Mr Pitt); this is the time, let us crush the whole house of Bourbon. But if the members of this board are of a different opinion, this is the last time I shall ever mix in its councils. I was called into the ministry by the voice of the people, and to them I hold myself answerable for my conduct. I am to thank the ministers of the late king for their support; I have served my country with success; but I will not be responsible for the conduct of the war any longer than while I have the direction of it." To this bold declaration, the lord who then presided in council, made the following reply. "I find the gentleman is determined to leave us; nor can I say that I am sorry for it, since he would otherwise have certainly compelled us to leave him. But if he is resolved to assume the right of advising his majesty, and directing the operations of the war, to what purpose are we called to this council? When he talks of being responsible to the people, he talks the language of the house of commons, and forgets that at this board he is responsible only to the king. However, though he may possibly have convinced himself of his infallibility, still it remains that we should be equally convinced before we can resign our understandings to his direction, or join with him in the measure he proposes."

This conversation, which was followed by Mr Pitt's resignation, is sufficient to shew the haughtiness and imperious temper of our minister. However, these very qualities were sometimes productive of great and good consequences, as appears from the following anecdote. — Preparatory to one of the secret expeditions during the last war, the minister had given orders to the different presiding officers in the military, navy, and ordnance departments, to prepare a large body of forces, a certain number of ships, and a proportionable quantity of stores, &c. and to have them all ready against a certain day. To these orders he received an answer from each of the officers, declaring the total impossibility of a compliance with them. Notwithstanding it was then at a very late hour, he sent immediately for his secretary; and after expressing his resentment at the ignorance or negligence of his majesty's servant,

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servant,

Pitt.

vants, he gave the following commands:—"I desire, Mr Wood, that you will immediately go to Lord Anson; you need not trouble yourself to search the admiralty, he is not to be found there; you must pursue him to the gaming-house, and tell him from me, that if he does not obey the orders of government which he has received at my hands, that I will most assuredly impeach him. Proceed from him to Lord Ligonier; and though he should be bolstered with harlots, undraw his curtains, and repeat the same message. Then direct your course to Sir Charles Frederick, and assure him, that if his majesty's orders are not obeyed, they shall be the last which he shall receive from me."

In consequence of these commands, Mr Wood proceeded to White's, and told his errand to the first lord of the admiralty; who insisted that the secretary of state was out of his senses, and it was impossible to comply with his wishes: "however," (added he), "as madmen must be answered, tell him that I will do my utmost to satisfy him." From thence he went to the commander in chief of the forces, and delivered the same message. He also said that it was an impossible business; "and the secretary knows it," (added the old lord): nevertheless, he is in the right to make us do what we can; and what is possible to do, inform him, shall be done." The surveyor-general of the ordnance was next informed of Mr Pitt's resolution; and, after some little consideration, he began to think that the orders might be completed within the time prescribed. The consequence, at last, was that every thing, in spite of impossibilities themselves, was ready at the time appointed.

After his resignation in 1761, Mr Pitt never had any share in administration. He received a pension of 3000 l. a-year, to be continued after his decease, during the surivivance of his lady and son; and this gratuity was dignified with the title of *Baroness of Chatham* to his lady, and that of *baron* to her heirs-male. Mr Pitt at that time declined a title of nobility; but in 1766 accepted of a peerage under the title of *Baron Pynsent and Earl of Chatham*, and at the same time he was appointed lord privy-seal.

This acceptance of a peerage proved very prejudicial to his lordship's character. However, he continued steadfast in his opposition to the measures of administration. His last appearance in the House of Lords was on the 2d of April 1778. He was then very ill and much debilitated: but the question was important; being a motion of the duke of Richmond to address his majesty to remove the ministers, and make peace with America on any terms. His lordship made a long speech, which had certainly overcome his spirits: for, attempting to rise a second time, he fell down in a convulsive fit; and though he recovered for that time, his disorder continued to increase till the 11th of May, when he died at his seat at Hayes. His death was lamented as a national loss. As soon as the news reached the house of commons, which was then sitting, Colonel Barré made a motion, that an address should be presented to his majesty, requesting that the Earl of Chatham should be buried at the public expence. But Mr Rigby having proposed the erecting of a statue to his memory, as more likely to perpetuate the sense of his great merits entertained by the public, this was unanimously carried. A bill was soon after

passed, by which 4000 l. a-year was settled upon John, now Earl of Chatham, and the heirs of the late Earl to whom that title may descend.—His lordship was married in 1754 to Lady Hester, sister to the earl of Temple; by whom he had three sons and two daughters.

PITUITARY GLAND. See **ANATOMY**, n° 397, c.

PIVAT, or **PIVOT**, a foot or shoe of iron or other metal, usually conical or terminating in a point, whereby a body, intended to turn round, bears on another fixed at rest, and performs its revolutions. The pivot usually bears or turns round in a sole, or piece of iron or brass, hollowed to receive it.

PIZARRO (Francis), a celebrated Spanish general, the discoverer and conqueror of Peru, in conjunction with Diego Almagro, a Spanish navigator. They are both charged with horrid cruelties to the inhabitants; and they fell victims to their own ambition, jealousy, and avarice. Almagro revolting, was defeated, and beheaded by Pizarro, who was assassinated by Almagro's friends, in 1541. See **PERU**.

PLACE, **LOCUS**, in philosophy, a mode of space, or that part of immovable space which any body possesses. See **METAPHYSICS**, n° 50.

PLACE in astronomy. The place of the sun, a star, &c. denotes the sign and degree of the zodiac which the luminary is in; or the degree of the ecliptic, reckoning from the beginning of aries, which the planet or star's circle of longitude cuts; and therefore coincides with the longitude of the sun, planet, or star. As the sine of the sun's greatest declination $23^{\circ} 30'$: to the sine of any present declination given or observed, for instance, $23^{\circ} 15'$: so is the radius 10: to the sine of his longitude $81^{\circ} 52'$; which, if the declination were north, would give $20^{\circ} 52'$ of gemini; if south, $20^{\circ} 52'$ of capricorn, for the sun's place. See **DECLINATION**, &c.

The place of the moon being that part of her orbit wherein she is found at any time, is of various kinds, by reason of the great inequalities of the lunar motions, which render a number of equations and reductions necessary before the just point be found. The moon's fictitious place is her place once equated; her place nearly true, is her place twice equated; and her true place thrice equated. See **ASTRONOMY**, *passim*.

PLACE, in war, a general name for all kinds of fortresses where a party may defend themselves. Thus, 1. A strong or fortified place, is one flanked, and covered with bastions. 2. A regular place, one whose angles, sides, bastions, and other parts, are equal; and this is usually denominated from the number of its angles, as a pentagon, hexagon, &c. 3. Irregular place, is one whose sides and angles are unequal. 4. Place of arms, is a strong city or town pitched upon for the chief magazine of an army; or, in a city or garrison, it is a large open spot of ground, usually near the centre of the place where the grand guard is commonly kept, and the garrison holds its rendezvous at reviews, and in cases of alarm to receive orders from the governor. 5. Places of arms of an attack, in a siege, is a spacious place covered from the enemy by a parapet or epaulement, where the soldiers are posted ready to sustain those at work in the trenches against the soldiers of the garrison. 6. Place of arms particular, in a garrison, a place near every bastion, where

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Place Plagiary. where the soldiers sent from the grand place to the quarters assigned them relieve those that are either upon the guard or in fight. 7. Place of arms without, is a place allowed to the covert-way for the planting of cannon, to oblige those who advance in their approaches to retire. 8. Place of arms in a camp, a large place at the head of the camp for the army to be ranged in and drawn up in battalia. There is also a place for each particular body, troop, or company, to assemble in.

Common-Place. See COMMON-Place.

PLACENTA, in anatomy and midwifery, a soft roundish mass, found in the womb of pregnant women; which, from its resemblance to the liver, was called by the ancients *hepar uterinum*, uterine liver.

PLACENTIA, a town of Italy, and capital of a duchy of the same name, with a bishop's see. It is seated about 100 paces from the river Po, in a very fertile pleasant plain, watered by a great number of rivulets, and surrounded with hills, abounding in all sorts of fruits. In its territory there are salt-springs, from which they make a very white salt; and there are also mines of iron, woods, and warrens. It is very populous, and contains a great number of merchants. It is defended by a wall and a strong citadel, and is reckoned three miles in circumference. The houses are low, generally built of brick, and some of them are prettily painted. The cathedral is an ancient structure, but well adorned within. The number of the inhabitants is about 18,000, among whom there are 2000 ecclesiastics. This city has been taken several times in the wars of Italy. The king of Sardinia took possession of it in 1744, it being ceded to him by the queen of Hungary; but it was taken from him in 1746, after a bloody battle. It has a famous university, and the inhabitants are much esteemed for their politeness. There is a great fair here every year on the 15th of April, which is much frequented. Placentia is seated on the river Po, in E. Long. 9. 43. N. Lat. 45. 5.

PLAGIARY, in philology, the purloining another man's works, and putting them off as our own. Among the Romans, *plagiarius* was properly a person who bought, sold, or retained a freeman for a slave; and was so called, because, by the Flavian law, such persons were condemned *ad plagas*, "to be whipped."

Thomasius has an express treatise *De plagio literario*; wherein he lays down the laws and measures of the right which authors have to one another's writings.—"Dictionary-writers, at least such as meddle with *arts and sciences*, (as is pertinently observed by Mr Chambers), seem exempted from the common laws of *meum and tuum*; they do not pretend to set up on their own bottom, nor to treat you at their own cost. Their works are supposed, in great measure, compositions of other peoples'; and what they take from others, they do it avowedly, and in the open sun.—In effect, their quality gives them a title to every thing that may be for their purpose, wherever they find it; and if they rob, they do not do it any otherwife, than as the bee does, for the public service. Their occupation is not pillaging, but collecting contributions; and if you ask them their authority, they will produce you the

practice of their predecessors of all ages and nations."

PLAGIUM, in law. See KIDNAPPING.

PLAGUE, PESTILENCE, or *Pessilential Fevvr*. See MEDICINE, n^o 325.

The commission at Moscow, having, in the year 1770, invented a fumigation-powder, which, from several lesser experiments, had proved efficacious in preventing the infection of the plague; in order more fully to ascertain its virtue in that respect, it was determined, towards the end of the year, that ten malefactors under sentence of death, should, without undergoing any other precautions than the fumigations, be confined three weeks in a lazarette, be laid upon the beds, and dressed in the cloaths, which had been used by persons sick, dying, and even dead, of the plague in the hospital. The experiment was accordingly tried, and none of the ten malefactors were then infected, or have been since ill. The fumigation-powder is prepared as follows.

Powder of the first strength.] Take leaves of juniper, juniper-berries pounded, ears of wheat, guaiacum-wood pounded, of each six pounds; common saltpetre pounded, eight pounds; sulphur pounded, six pounds; Smyrna tar, or myrrh, two pounds; mix all the above ingredients together, which will produce a pood of the powder of fumigation of the first strength. [*N.B.* A pood is 40 pounds Russian, which are equal to 35 pounds and a half or 36 pounds English averdupoise.]

Powder of the second strength.] Take southernwood cut into small pieces, four pounds; juniper-berries pounded, three pounds; common saltpetre pounded, four pounds; sulphur pounded, two pounds and a half; Smyrna tar, or myrrh, one pound and a half; mix the above together, which will produce half a pood of the powder of fumigation of the second strength.

Odoriferous powder.] Take the root called *kalmus* cut into small pieces, three pounds; leaves of juniper cut into small pieces, four pounds; frankincense pounded grossly, one pound; storax pounded, and rose-flowers, half a pound; yellow amber pounded, one pound; common saltpetre pounded, one pound and a half; sulphur, a quarter of a pound; mix all the above together, which will produce nine pounds and three quarters of the odoriferous powder.

Remark on the powder of fumigation.] If guaiacum cannot be had, the cones of pines or firs may be used in its stead; likewise the common tar of pines and firs may be used instead of the Smyrna tar or myrrh, and mugwort may supply the place of southernwood.

PLAIN, or PLANE, in general, an appellation given to whatever is smooth and even, or simple, obvious, and easy to be understood; and, consequently, stands opposed to rough, enriched, or laboured.

A plain figure, in geometry, is an uniform surface; from every point of whose perimeter right lines may be drawn to every other point in the same.

A plain angle is one contained under two lines, or surfaces, in contradistinction to a solid angle. See ANGLE.

The doctrine of plain triangles, as those included under three right lines, is termed *plain trigonometry*. See the article TRIGONOMETRY.

PLAIN Chart. See the article CHART.

PLAIN-

Plain
Plane.

PLAIN-Sailing. See NAVIGATION, § 1.

PLAISE, the English name of a species of pleuronectes. See PLEURONCTES.

PLAN, in general, denotes the representation of something drawn on a plane: such are maps, charts, ichnographies, &c. See MAP, CHART, &c.

The term *plan*, however, is particularly used for a draught of a building, such as it appears, or is intended to appear, on the ground; shewing the extent, division, and distribution of its area, or ground-plot, into apartments, rooms, passages, &c.

A geometrical plan is that wherein the solid and vacant parts are represented in their natural proportions.

The raised plan of a building, is the same with what is otherwise called an *elevation*, or *orthography*. See ORTHOGRAPHY.

A perspective plan, is that exhibited by degradations, or diminutions, according to the rules of perspective. See PERSPECTIVE.

To render plans intelligible, it is usual to distinguish the masses, with a black wash; the projections on the ground are drawn in full lines, and those supposed over them in dotted lines. The augmentations, or alterations to be made, are distinguished by a colour different from what is already built; and the tints of each plan made lighter, as the stories are raised.

In large buildings, it is usual to have three several plans, for the three first stories.

PLANE, in geometry, denotes a plain surface, or one that lies evenly between its bounding lines: and as a right line is the shortest extension from one point to another, so a plane surface is the shortest extension from one line to another.

In astronomy, conics, &c. the term *plane* is frequently used for an imaginary surface, supposed to cut and pass through solid bodies; and on this foundation is the whole doctrine of conic sections built. See ASTRONOMY, CONIC SECTIONS, &c.

In mechanics, planes are either horizontal, that is, parallel to the horizon, or inclined thereto. See MECHANICS.

The determining how far any given plane deviates from an horizontal line, makes the whole business of levelling. See the article LEVELLING.

In optics, the planes of reflection and refraction, are those drawn through the incident and reflected or refracted rays. See OPTICS.

In perspective, we meet with the perspective plane, which is supposed to be pellucid, and perpendicular to the horizon; the horizontal plane, supposed to pass through the spectator's eye, parallel to the horizon; the geometrical plane, likewise parallel to the horizon, wherein the object to be represented is supposed to be placed, &c. See PERSPECTIVE.

The plane of projection in the stereographic projection of the sphere, is that on which the projection is made, corresponding to the perspective plane. See PROJECTION.

PLANE, in joinery, an edged tool or instrument for parting and shaving of wood smooth.—It consists of a piece of wood very smooth at bottom, as a stock or shaft; in the middle of which is an aperture, through which a steel edge, or chisel, placed obliquely, passes;

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which, being very sharp, takes off the inequalities of the wood along which it slides.

PLANE-Tree, in botany. See PLATANUS.

PLANET, a celestial body, revolving round the sun as a centre, and continually changing its position with respect to the fixed stars; whence the name *planet*, which is a Greek word, signifying “wanderer.”

The planets are usually distinguished into primary, and secondary. The primary ones, called by way of eminence *planets*, are those which revolve round the sun as a centre; and the secondary planets, more usually called *satellites*, or *moons*, are those which revolve round a primary planet as a centre, and constantly attend it in its revolution round the sun.

The primary planets, are again distinguished into superior and inferior. The superior planets, are those further from the sun than our earth; as Mars, Jupiter, and Saturn; and the inferior planets, are those nearer the sun than our earth, as Venus and Mercury. See ASTRONOMY.

That the planets are opaque bodies, like our earth, is thought probable, for the following reasons. 1. Since in Venus, Mercury, and Mars, only that part of the disk illuminated by the sun, is found to shine; and again, Venus and Mercury, when between the earth and the sun, appear like dark spots or macule on the sun's disk; it is evident, that Mars, Venus, and Mercury, are opaque bodies, illuminated with the borrowed light of the sun. And the same appears of Jupiter, from its being void of light in that part to which the shadow of the satellites reaches, as well as in that part turned from the sun; and that his satellites are opaque, and reflect the sun's light, is abundantly shown. Wherefore, since Saturn, with his ring and satellites, only yield a faint light, fainter considerably than that of the fixed stars, tho' these be vastly more remote; and than that of the rest of the planets; it is past doubt, that he too, with his attendants, are opaque bodies. 2. Since the sun's light is not transmitted through Mercury and Venus, when placed against him, it is plain they are dense opaque bodies; which is likewise evident of Jupiter, from his hiding the satellites in his shadow; and therefore, by analogy, the same may be concluded of Saturn. 3. From the variable spots of Venus, Mars, and Jupiter, it is evident these planets have a changeable atmosphere; which changeable atmosphere may, by a like argument, be inferred of the satellites of Jupiter; and therefore, by similitude, the same may be concluded of the other planets. 4. In like manner, from the mountains observed in Venus, the same may be supposed in the other planets. 5. Since then, Saturn, Jupiter, both their satellites, Mars, Venus, and Mercury, are opaque bodies, shining with the sun's borrowed light, are furnished with mountains, and encompassed with a changeable atmosphere; they have, of consequence, waters, seas, &c. as well as dry land, and are bodies like the moon, and therefore like the earth. Q. E. D. And hence, it seems also highly probable, that the other planets have their animal inhabitants, as well as our earth.

PLANETARIUM, an astronomical machine, so called from its representing the motions, orbits, &c.

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of

Plane
Planetarium.

Planetary of the planets, agreeable to the Copernican system. See Astronomy, n^o 317. and Plate LL. Plant.

PLANETARY, something that relates to the planets. Hence we say, planetary worlds, planetary inhabitants, &c. Huygens and Fontenelle bring several probable arguments for the reality of planetary animals, plants, men, &c. See PLANET.

PLANETARY System, is the system or assemblage of the planets, primary and secondary, moving in their respective orbits, round their common centre the sun. See ASTRONOMY.

PLANETARY Days.—Among the ancients, the week was shared among the seven planets, each planet having its day. This we learn from Dion Cassius and Plutarch, *Synops.* l. 4. q. 7. Herodotus adds, that it was the Egyptians who first discovered what god, that is, what planet, presides over each day; for that among this people the planets were directors. And hence it is, that in most European languages, the days of the week are still denominated from the planets; Sunday, Monday, &c. See WEEK.

PLANETARY Years, the periods of time where the several planets make their revolutions round the sun, or earth.—As from the proper revolution of the sun, the solar year takes its original; so from the proper revolutions of the rest of the planets about the earth, so many sorts of years do arise, viz. the Saturnian year, which is defined by 29 Egyptian years, 174 hours, 58 minutes, equivalent in a round number to 30 solar years.—The Jovial year, containing 317 days, 14 hours, 59 minutes.—The Martial year, containing 321 days, 23 hours, 31 minutes.—For Venus and Mercury, as their years, when judged of with regard to the earth, are almost equal to the solar year; they are more usually estimated from the sun, the true centre of their motions: in which case, the former is equal to 224 days, 16 hours, 40 minutes; the latter to 87 days, 23 hours, 14 minutes.

PLANIMETRY, that part of geometry which considers lines and plain figures, without considering their height or depth. See GEOMETRY.

PLANISPHERE, signifies a projection of the sphere, and its various circles on a plane; in which sense, maps, whereon are exhibited the meridians, and other circles of the sphere, are planispheres. See MAP.

PLANT, is defined to be an organical body, destitute of sense and spontaneous motion, adhering to another body in such a manner as to draw from it its nourishment, and having a power of propagating itself by seeds.

The vegetation and economy of plants is one of those subjects in which our knowledge is extremely circumscribed. A total inattention to the structure and economy of plants is the chief reason of the small progress that has been made in the principles of vegetation, and of the infatigable and fluctuation of our theories concerning it; for which reason we shall give a short description of the structure of plants, beginning with the seed, and tracing its progress and evolution to a state of maturity.

1. *Of Seeds.*] The seeds of plants are of various figures and sizes. Most of them are divided into two lobes; though some, as those of the cress-kind, have six; and others, as the grains of corn, are not divided, but entire.

But, as the essential properties of all seeds are the same, when considered with regard to the principles of vegetation, our particular descriptions shall be limited to one feed, viz. the great garden-bean. Neither is the choice of this feed altogether arbitrary; for, after it begins to vegetate, its parts are more conspicuous than many others, and consequently better calculated for investigation.

This feed is covered with two coats or membranes. The outer coat is extremely thin, and full of pores; but may be easily separated from the inner one (which is much thicker), after the bean has been boiled, or lain a few days in the soil. At the thick end of the bean, there is a small hole visible to the naked eye, immediately over the radicle or future root, that it may have a free passage into the soil; fig. 1. A. When these coats are taken off, the body of the feed appears, which is divided into two smooth portions or lobes. The smoothness of the lobes is owing to a thin film or cuticle with which they are covered.

At the basis of the bean is placed the radicle or future root, fig. 3. A. The trunk of the radicle, just as it enters into the body of the feed, divides into two capital branches, one of which is inserted into each lobe, and sends off smaller ones in all directions thro' the whole substance of the lobes; fig. 7. AA. These ramifications become so extremely minute towards the edges of the lobes, that they require the finest glasses to render them visible. To these ramifications Grew and Malpighius have given the name of *feminal root*; because, by means of it, the radicle and plume, before they are expanded, derive their principal nourishment.

The plume, bud, or germ, fig. 3. is inclosed in two small corresponding cavities in each lobe. Its colour and consistence is much the same with those of the radicle, of which it is only a continuation; but having a quite contrary direction: for the radicle descends into the earth, and divides into a great number of smaller branches or filaments; but the plume ascends into the open air, and unfolds itself into all the beautiful variety of stem, branches, leaves, flowers, fruit, &c. The plume in corn shoots from the smaller end of the grain, and, among maltsters, goes by the name of *acrospire*.

The next thing to be taken notice of is the substance, or parenchymatous part, of the lobes. This is not a mere concentered juice, but is curiously organized, and consists of a vast number of small bladders resembling those in the pith of trees; fig. 4.

Besides the coats, cuticle, and parenchymatous parts, there is a substance perfectly distinct from these, distributed in different proportions through the radicle, plume, and lobes. This inner substance appears very plainly in a transverse section of the radicle or plume. Towards the extremity of the radicle, it is one entire trunk; but higher up, it divides into three branches; the middle one runs directly up to the plume, and the other two pass into the lobes on each side, and spread out into a great variety of small branches through the whole body of the lobes, fig. 7. This substance is very properly termed the *feminal root*: for when the feed is sown, the moisture is first absorbed by the outer coats, which are every where furnished with sap and air-vessels; from these it is conveyed to the cuticle; from the

cuticle it proceeds to the pulpy part of the lobes; when it has got thus far, it is taken up by the mouths of the small branches of the feminal root, and passes from one branch into another, till it is all collected into the main trunk, which communicates both with the plume and radicle, the two principal involved organs of the future plant. After this the sap, or vegetable food, runs in two opposite directions: part of it ascends into the plume, and promotes the growth and expansion of that organ; and part of it descends into the radicle, for nourishing and evolving the root and its various filaments. Thus the plume and radicle continue their progress in opposite directions, till the plant arrives at maturity.

It is here worth remarking, that every plant is really possessed of two roots, both of which are contained in the seed. The plume and radicle, when the seed is first deposited in the earth, derive their nourishment from the feminal root: but, afterwards, when the radicle begins to shoot out its filaments, and to absorb some moisture, not, however, in a sufficient quantity to supply the exigencies of the plume, the two lobes, or main body of the seed, rise along with the plume, assume the appearance of two leaves, resembling the lobes of the seed in size and shape, but having no resemblance to those of the plume, for which reason they have got the name of *diffimilar leaves*.

These dissimilar leaves defend the young plume from the injuries of the weather; and at the same time, by absorbing dew, air, &c. assist the tender radicle in nourishing the plume, with which they have still a connection by means of the feminal root above described. But, when the radicle or second root has descended deep enough into the earth, and has acquired a sufficient number of filaments or branches for absorbing as much aliment as is proper for the growth of the plume; then the feminal or dissimilar leaves, their utility being entirely superseded, begin to decay and fall off.

Plate
CCXXXIX Fig. 1. A, the foramen or hole in the bean through which the radicle shoots into the soil.

Fig. 2. A transverse section of the bean; the dots being the branches of the feminal root.

Fig. 3. A, the radicle. B, the plume or bud.

Fig. 4. A, a longitudinal section of one of the lobes of the bean a little magnified, to show the small bladders of which the pulpy or parenchymatous part is composed.

Fig. 5, 6. A, a transverse section of the radicle. B, a transverse section of the plume, showing the organs or vessels of the feminal root.

Fig. 7. A view of the feminal root branched out upon the lobes.

Fig. 8. The appearance of the radicle, plume, and feminal root, when a little further advanced in growth.

Having thus briefly described the seed, and traced its evolution into three principal organic parts, *viz.* the plume, radicle, and feminal leaves, we shall next take an anatomical view of the root, trunk, leaves, &c.

2. *Of the Root.* In examining the root of plants, the first thing that presents itself is the skin, which is of various colours in different plants. Every root, after it has arrived at a certain age, has a double skin. The first is coeval with the other parts, and exists in the seed: but afterwards there is a ring sent off from the bark, and forms a second skin; *e. g.* in the root of the

dandelion, towards the end of May, the original or outer skin appears shriveled, and is easily separated from the new one, which is fresher, and adheres more firmly to the bark. Perennial plants are supplied in this manner with a new skin every year; the outer one always falls off in the autumn and winter, and a new one is formed from the bark in the succeeding spring. The skin has numerous cells or vessels, and is a continuation of the parenchymatous part of the radicle. However, it does not consist solely of parenchyma; for the microscope shews that there are many tubular ligneous vessels interspersed through it.

When the skin is removed, the true cortical substance or bark appears, which is also a continuation of the parenchymatous part of the radicle, but greatly augmented. The bark is of very different sizes. In most trees, it is exceeding thin in proportion to the wood and pith. On the other hand, in carrots, it is almost one half of the semidiameter of the root; and, in dandelion, it is nearly twice as thick as the woody part.

The BARK is composed of two substances; the parenchyma, or pulp, which is the principal part; and a few woody fibres. The parenchyma is exceedingly porous, and has a great resemblance to a sponge; for it shrivels considerably when dried, and dilates to its former dimensions when infused in water. These pores or vessels are not pervious so as to communicate with each other; but consist of distinct little cells or bladders, scarcely visible without the assistance of the microscope. In all roots, these cells are constantly filled with a thin watery liquor. They are generally of a spherical figure; though in some roots, as the bugloss and dandelion, they are oblong. In many roots, as the horse-radish, peony, asparagus, potatoe, &c. the parenchyma is of one uniform structure. But in others it is more diversified, and puts on the shape of rays running from the centre towards the circumference of the bark. These rays sometimes run quite through the bark, as in lovage; and sometimes advance towards the middle of it, as in melilot and most of the leguminous and umbelliferous plants. These rays generally stand at an equal distance from each other in the same plant; but the distance varies greatly in different plants. Neither are they of equal sizes: in carrot they are exceedingly small, and scarcely discernible; in melilot and chervil, they are thicker. They are likewise more numerous in some plants than in others. Sometimes they are of the same thickness from one edge of the bark to the other; and some grow wider as they approach towards the skin. The vessels with which these rays are amply furnished, are supposed to be air-vessels, because they are always found to be dry, and not so transparent as the vessels which evidently contain the sap.

In all roots, there are ligneous vessels dispersed in different proportions through the parenchyma of the bark. These ligneous vessels run longitudinally through the bark in the form of small threads, which are tubular, as is evident from the rising of the sap in them when a root is cut transversely. These ligneous sap-vessels do not run in direct lines through the bark, but, at small distances, incline towards one another in such a manner, that they appear to the naked eye to be insulated; but the microscope discovers them to be

only contiguous, and braced together by the parenchyma. These braces or coarctations are very various both in size and number in different roots; but in all plants they are most numerous towards the inner edge of the bark. Neither are these vessels single tubes; but, like the nerves in animals, are bundles of 20 or 30 small contiguous cylindrical tubes, which uniformly run from the extremity of the root, without feeding off any branches, or suffering any change in their size or shape.

In some roots, as parsnip, especially in the ring next the inner extremity of the bark, these vessels contain a kind of lymph, which is sweeter than the sap contained in the bladders of the parenchyma. From this circumstance they have got the name of *lymph-ducts*.

These lymph-ducts sometimes yield a mucilaginous lymph, as in the comfrey; and sometimes a white milky glutinous lymph, as in the angelica, fenchus, burdock, scorzonera, dandelion, &c. The lymph-ducts are supposed to be the vessels from which the gums and ballams are secreted. The lymph of fennel, when exposed to the air, turns into a clear transparent balsam; and that of the scorzonera, dandelion, &c. condenses into a gum.

The situation of the vessels is various. In some plants, they stand in a ring or circle at the inner edge of the bark, as in asparagus; in others, they appear in lines, or rays, as in borage; in the parsnip, and several other plants, they are most conspicuous toward the outer edge of the bark; and in the dandelion, they are disposed in the form of concentric circles.

The Wood of roots is that part which appears after the bark is taken off, and is firmer and less porous than the bark or pith. It consists of two distinct substances, *viz.* the pulpy or parenchymatous, and the ligneous. The wood is connected to the bark by large portions of the bark inserted into it. These insertions are mostly in the form of rays, tending to the centre of the pith, which are easily discernible by the eye in a transverse section of most roots. These insertions, like the bark, consist of many vessels, mostly of a round or oval figure.

The ligneous vessels are generally disposed in collateral rows running longitudinally through the root. Some of these contain air, and others sap. The *air-vessels* are so called, because they contain no liquor. These air-vessels are distinguished by being whiter than the others.

The PITH is the central part of the root. Some roots have no pith, as the stramonium, nicotiana, &c.; others have little or none at the extremities of the roots, but have a considerable quantity of it near the top. The pith, like every other part of a plant, is derived from the seed: but in some it is more immediately derived from the bark. For the insertions of the bark running in betwixt the rays of the wood, meet in the centre, and constitute the pith. It is owing to this circumstance, that, among roots which have no pith in their lower parts, they are amply provided with it towards the top, as in columbine, lovage, &c.

The bladders of the pith are of very different sizes, and generally of a circular figure. Their position is more uniform than in the bark. Their sides are not mere films, but a composition of small fibres or threads;

which gives the pith, when viewed with a microscope, the appearance of a piece of fine gauze or net-work.

We shall conclude the description of roots, with observing, that their whole substance is nothing but a congeries of tubes and fibres, adapted by nature for the absorption of nourishment, and of course the extension and augmentation of their parts.

Fig. 9. A transverse section of the root of worm-wood, as it appears to the naked eye. Plate CCXXXIX

Fig. 10. A section of fig. 9. magnified. AA, the skin, with its vessels. BBBB, the bark. The round holes CCC, &c. are the lymph-ducts of the bark: All the other holes are little cells and sap-vessels. DDD, parenchymatous insertions from the bark, with the cells, &c. EEEE, the rays of the wood, in which the holes are the air-vessels. N. B. This root has no pith.

3. *Of the Trunk, Stalk, or Stem.*] In describing the trunks of plants, it is necessary to premise, that whatever is said with regard to them, applies equally to the branches.

The trunk, like the root, consists of three parts, *viz.* the bark, wood, and pith. These parts, though substantially the same in the trunk as in the root, are in many cases very different in their texture and appearance.

The skin of the BARK is composed of very minute bladders, interspersed with longitudinal woody fibres, as in the nettle, thistle, and most herbs. The outside of the skin is visibly porous in some plants, particularly the cane.

The principal body of the bark is composed of pulp or parenchyma, and innumerable vessels much larger than those of the skin. The texture of the pulpy part, though the same substance with the parenchyma in roots, yet seldom appears in the form of rays running towards the pith; and when these rays do appear, they do not extend above half way to the circumference. The vessels of the bark are very differently situated, and destined for various purposes in different plants. For example, in the bark of the pine, the inmost are lymph-ducts, and exceedingly small; the outmost are gum or resiniferous vessels, destined for the secretion of turpentine; and are so large, as to be distinctly visible to the naked eye.

The WOOD lies between the bark and pith, and consists of two parts, *viz.* a parenchymatous, and ligneous. In all trees, the parenchymatous part of the wood, though much diversified as to size and consistence, is uniformly disposed in diametrical rays, or insertions running betwixt similar rays of the ligneous part.

The true wood is nothing but a congeries of old dried lymph-ducts. Between the bark and the wood a new ring of these ducts is formed every year, which gradually loses its softness as the cold season approaches, and, towards the middle of winter, is condensed into a solid ring of wood. These annual rings, which are distinctly visible in most trees when cut thro', serve as natural marks to distinguish their age, (fig. 1. 2.) The rings of one year are sometimes larger, sometimes less, than those of another, probably owing to the favourableness or unfavourableness of the season.

The PITH, though of a different texture, is exactly of the same substance with the parenchyma of the

Fig. 1. GARDEN BEAN

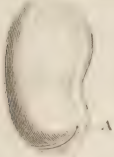


Fig. 2.



Fig. 3.



Fig. 4. Skin of a BEAN



Fig. 5.
Radical



Fig. 6.
Plume



Fig. 7.

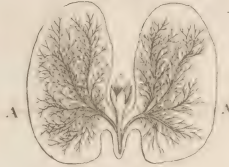


Fig. 8.



Fig. 10. Section of Fig. 9. Magnified

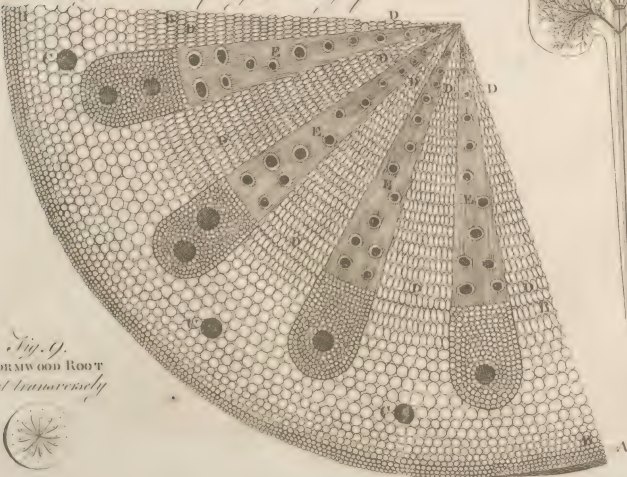


Fig. 9.
Wormwood Root
cut transversely





Plant. the bark, and the insertions of the wood. The quantity of pith is various in different plants. Instead of being increased every year like the wood, it is annually diminished, its vessels drying up, and assuming the appearance and structure of wood; inasmuch, that in old trees there is scarce such a thing as pith to be discerned.

A ring of sap-vessels are usually placed at the outer edge of the pith, next the wood. In the pine, fig, and walnut, they are very large. The parenchyma of the pith is composed of small cells or bladders, of the same kind with those of the bark, only of a larger size. The general figure of these bladders is circular; though in some plants, as the thistle and borage, they are angular. Though the pith is originally one connected chain of bladders; yet as the plant grows old, they shrivel, and open in different directions. In the walnut, after a certain age, it appears in the form of a regular transverse hollow division. In some plants, it is altogether wanting; in others, as the fuchsia, nettle, &c. there is only a transverse partition of it at every joint. Many other varieties might be mentioned; but these must be left to the observation of the reader.

Fig. 1. A transverse section of a branch of ash, as it appears to the eye.

Fig. 2. The same section magnified. AA, the bark. BBB, an arched ring of sap-vessels next the skin. CCC, the parenchyma of the bark with its cells, and another arched ring of sap-vessels. DD, a circular line of lymph-ducts immediately below the above arched ring. EE, the wood. F, the first year's growth. G, the second. H, the third year's growth. III, the true wood. KK, The great air-vessels. LL, the lesser ones. MM, the parenchymatous insertions of the bark represented by the white rays. NO, the pith, with its bladders or cells.

4. *Of the Leaves.*] The leaves of plants consist of the same substance with that of the trunk. They are full of nerves, or woody portions, running in all directions, and branching out into innumerable small threads, interwoven with the parenchyma like fine lace or gauze.

The skin of the leaf, like that of an animal, is full of pores, which both serve for perspiration, and for the absorption of dews, air, &c. These pores, or orifices, differ both in shape and magnitude in different plants, which is the cause of that variety of texture or grain peculiar to every plant.

The pulpy or parenchymatous part consists of very minute fibres, wound up into small cells or bladders. These cells are of various sizes in the same leaf.

All leaves, of whatever figure, have a marginal fibre, by which all the rest are bounded. The particular shape of this fibre determines the figure of the leaf.

The vessels of leaves have the appearance of intercalating; but, when examined by the microscope, they are found only to be interwoven, or laid along each other.

What are called *air-vessels*, or those which carry no sap, are visible even to the naked eye in some leaves. When a leaf is slowly broke, they appear like small woolly fibres, connected to both ends of the bro-

ken piece.

Fig. 1. The appearance of the air-vessels to the eye, in a vine-leaf drawn gently asunder.

Fig. 2. A small piece cut off that leaf.

Fig. 3. The same piece magnified, in which the vessels have the appearance of a screw.

Fig. 4. The appearance of these vessels as they exist in the leaf before they are stretched out.

5. *Of the Flower.*] It is needless here to mention any thing of the texture, or of the vessels, &c. of flowers, as they are pretty similar to those of the leaf. It would be foreign to our present purpose, to take any notice of the characters and distinctions of flowers. These belong to the science of BOTANY, to which the reader is referred.

There is one curious fact, however, which must not be omitted, *viz.* That every flower is perfectly formed in its parts many months before it appears outwardly; that is, the flowers which appear this year, are not, properly speaking, the flowers of this year, but of the last. For example, mezerion generally flowers in January; but these flowers were completely formed in the month of August preceding. Of this fact any one may satisfy himself by separating the coats of a tulip-root about the beginning of September; and he will find that the two innermost form a kind of cell, in the centre of which stands the young flower, which is not to make its appearance till the following April or May. Fig. 5. exhibits a view of the tulip-root when dissected in September, with the young flower towards the bottom.

6. *Of the Fruit.*] In describing the structure of fruits, a few examples shall be taken from such as are most generally known.

A *pear*, besides the skin, which is a production of the skin of the bark, consists of a double parenchyma, or pulp, sap, and air-vessels, calculary, and acetary.

The outer parenchyma is the same substance continued from the bark, only its bladders are larger and more succulent.

It is every where interperfed with small globules or grains, and the bladders respect these grains as a kind of centres, every grain being the centre of a number of bladders. The sap and air-vessels in this pulp are extremely small.

Next the core is the inner pulp or parenchyma, which consists of bladders of the same kind with the outer, only larger and more oblong, corresponding to those of the pulp, from which it seems to be derived. This inner pulp is much fouler than the other, and has none of the small grains interperfed thro' it; and hence it has got the name of *acetary*.

Between the acetary and outer pulp, the globules or grains begin to grow larger, and gradually unite into a hard stony body, especially towards the corculum, or foot of the fruit; and from this circumstance it has been called the *calculary*.

These grains are not derived from any of the organical parts of the tree; but seem rather to be a kind of concretions precipitated from the sap, similar to the precipitations from wine, urine, and other liquors.

The core is a roundish cavity in the centre of the pear, lined with a hard woody membrane, in which

Plant.

Plate
CCXL.

Plate
CCXL.

Plant.

which the seed is inclosed. At the bottom of the core there is a small duct or canal, which runs up to the top of the pear; this canal allows the air to get into the core, for the purpose of drying and ripening the seeds.

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CCXLI.

Fig. 1. A transverse section of a pear, as it appears to the naked eye. A, the skin, and a ring of sap-vessels. B, the outer parenchyma, or pulp, with its vessels, and ligneous fibres interperfed. C, the inner parenchyma, or acetary, with its vessels, which are larger than the outer one. D, the core and seeds.

Fig. 2. a piece cut off fig. 1.

Fig. 3. is fig. 2. magnified. A A A, the small grains or globules, with the vessels radiated from them.

Fig. 4. A longitudinal section of the pear, shewing a different view of the same parts with those of fig. 1. A, the channel, or duct, which runs from the top of the pear to the bottom of the core.

In a *lemon*, the parenchyma appears in three different forms. The parenchyma of the rind is of a coarse texture, being composed of thick fibres, woven into large bladders. Those nearest the surface contain the essential oil of the fruit, which bursts into a flame when the skin is squeezed over a candle. From this outmost parenchyma nine or ten infertions or lamellæ are produced, which run between as many portions of the pulp, and unite into one body in the centre of the fruit, which corresponds to the pith in trunks or roots. At the bottom and top of the lemon, this pith evidently joins with the rind, without the intervention of any lamellæ. This circumstance shows, that the pith and bark are actually connected in the trunk and roots of plants, though it is difficult to demonstrate the connection, on account of the closeness of their texture, and the minuteness of their fibres. Many vessels are dispersed thro' the whole of this parenchyma; but the largest ones stand on the inner edge of the rind, and the outer edge of the pith, just at the two extremities of each lamella.

The second kind of parenchyma is placed between the rind and the pith; is divided into distinct bodies by the lamellæ; and each of these bodies forms a large bag.

These bags contain a third parenchyma, which is a cluster of smaller bags, distinct and unconnected with each other, having a small stalk by which they are fixed to the large bag. Within each of these small bags are many hundreds of bladders, composed of extremely minute fibres. These bladders contain the acid juice of the lemon.

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CCXL.

Fig. 3. A longitudinal section of a lemon. A A A, the rind with the vessels which contain the essential oil. B B, the substance corresponding to the pith, formed by the union of the lamellæ, or infertions. C C, its continuation and connection with the rind, independent of the infertions.

Fig. 4. A transverse section of the lemon. B B B, &c. the nine pulpy bags, or second parenchyma, placed between the rind and the pith; and the cluster of small bags, which contain the acid juice, inclosed in the large ones. C C, the large vessels that surround the pith. D D, two of the large bags laid open, showing the seeds, and their connection with the lamellæ or membranes which form the large bags.

Of the Perspiration of PLANTS, and the quantity of

moisture daily imbibed by them.—These curious particulars have been determined with great accuracy by Dr Hales. The method he took to accomplish his purpose was as follows.—In the month of July, commonly the warmest season of the year, he took a large sun-flower three feet and an half high, which had been purposely planted in a flower-pot when young. He covered the pot with thin milled lead, leaving only a small hole to preserve a communication with the external air, and another by which he might occasionally supply the plant with water. Into the former he inserted a glass tube nine inches long, and another shorter tube into the hole by which he poured in the water; and the latter was kept close stoppered with a cork, except when there was occasion to use it. The holes in the bottom of the pot were also stoppered up with corks, and all the crevices shut with cement.—Things being thus prepared, the pot and plant were weighed for 15 several days; after which the plant was cut off close to the leaden plate, and the stump well covered with cement. By weighing, he found that there perspired through the unglazed porous pot two ounces every 12 hours; which being allowed for in the daily weighing of the plant and pot, the greatest perspiration, in a warm day, was found to be one pound 14 ounces; the middle rate of perspiration, one pound four ounces; the perspiration of a dry warm night without any sensible dew, was about three ounces; but when there was any sensible though small dew, the perspiration was nothing; and when there was a large dew, or some little rain in the night, the plant and pot was increased in weight two or three ounces.

In order to know what quantity was perspired from a square inch of surface, our author cut off all the leaves of the plant, and laid them in five several parcels, according to their several sizes; and then measured the surface of a leaf of each parcel, by laying over it a large lattice made with threads, in which each of the little squares were $\frac{1}{4}$ of an inch; by numbering of which, he had the surface of the leaves in square inches; which, multiplied by the number of leaves in the corresponding parcels, gave the area of all the leaves. By this method he found the surface of the whole plant above ground to be 5616 square inches, or 39 square feet. He dug up another sun-flower of nearly the same size, which had eight main roots, reaching 15 inches deep and sideways, from the stem. It had besides a very thick bush of lateral roots from the eight main roots, extending every way in a hemisphere about nine inches from the stem and main roots. In order to estimate the length of all the roots, he took one of the main roots with its laterals, and measured and weighed them; and then weighed the other seven with their laterals; by which means he found the sum of all their lengths to be 1448 feet. Supposing then the periphery of these roots at a medium to be 0.131 of an inch, then their surface will be 2276 square inches, or 15.8 square feet; that is, equal to 0.4 of the surface of the plant above ground. From calculations drawn from these observations it appears, that a square inch of the upper surface of this plant perspires $\frac{1}{10}$ part of an inch in a day and a night; and that a square inch of the surface underground imbibed $\frac{1}{4}$ of an inch in the same time.

Plant.

The

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Fig. 2.
Transverse section of the ASH BRANCH. Magnified

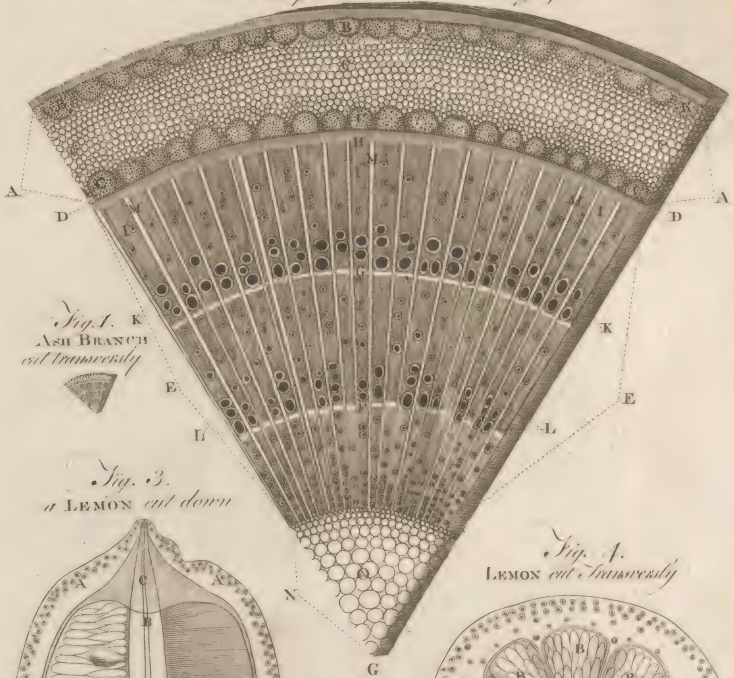


Fig. 1. K
ASH BRANCH
cut transversely



Fig. 3.
a LEMON cut down

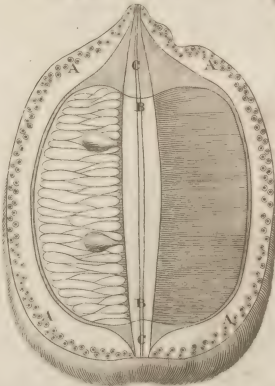
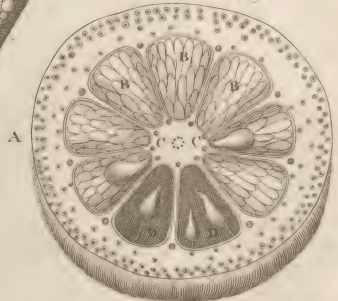


Fig. 4.
LEMON cut transversely



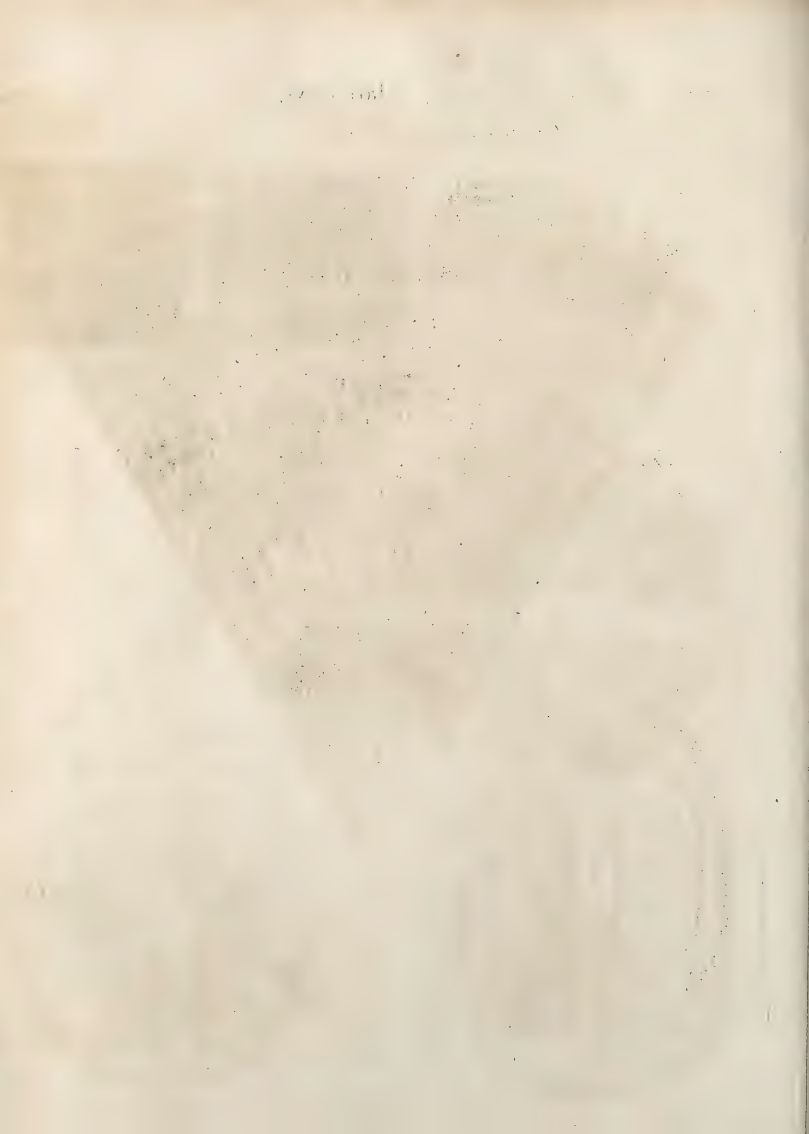


Fig. 2.
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Fig. 1.
VINE LEAF



Fig. 5.
TULIP ROOT



Fig. 3.

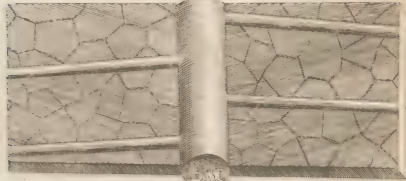
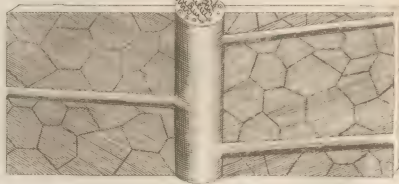


Fig. 4.



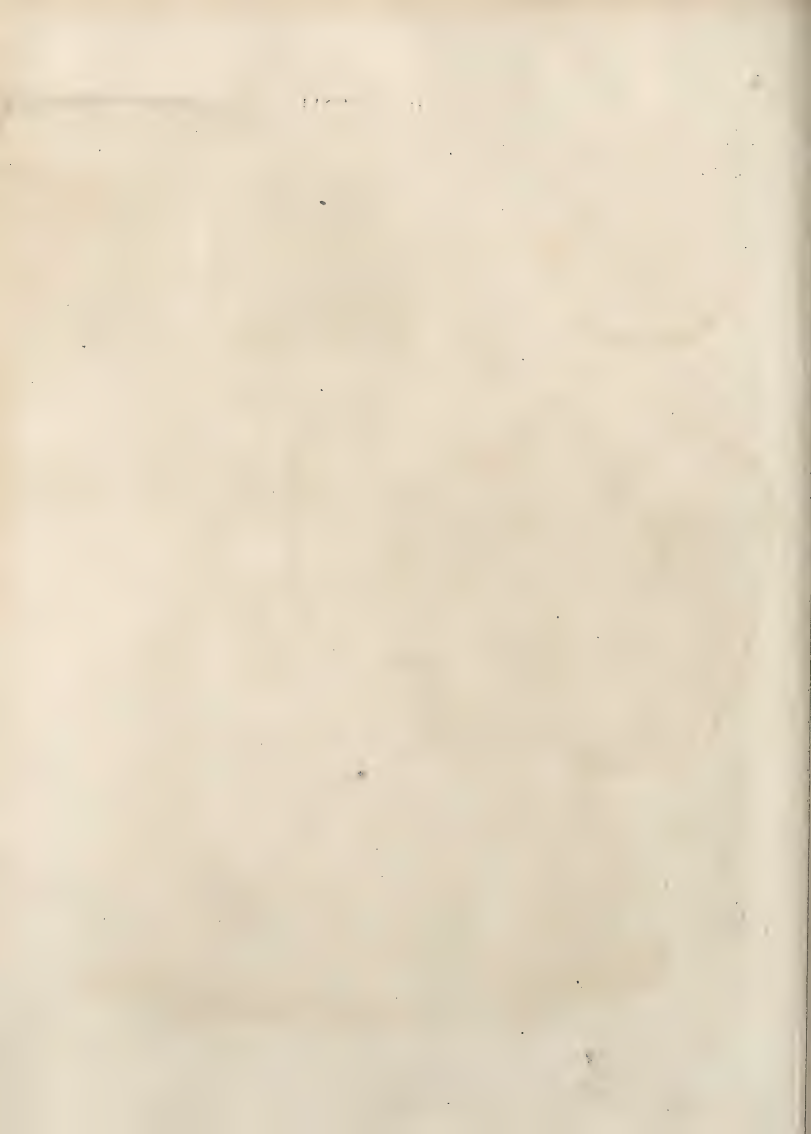


Fig. 1.
PEAR
Cut Transversely

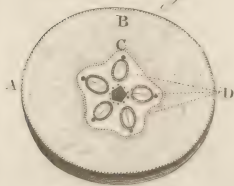


Fig. 1.
PEAR
Cut Longitudinally

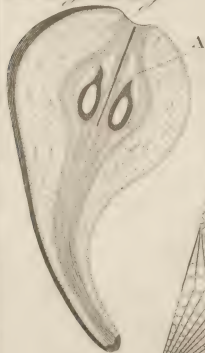


Fig. 2. is Fig. 2. magnified

3

3

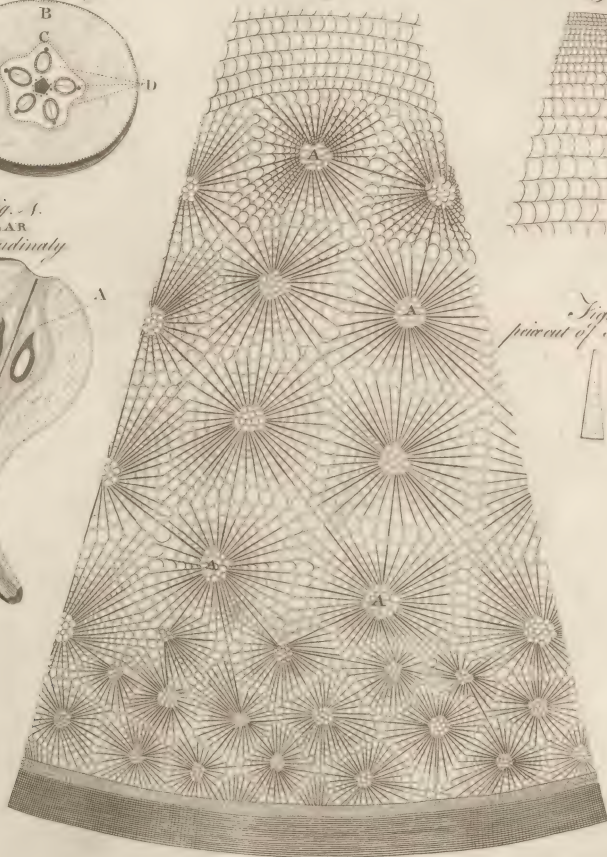
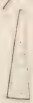
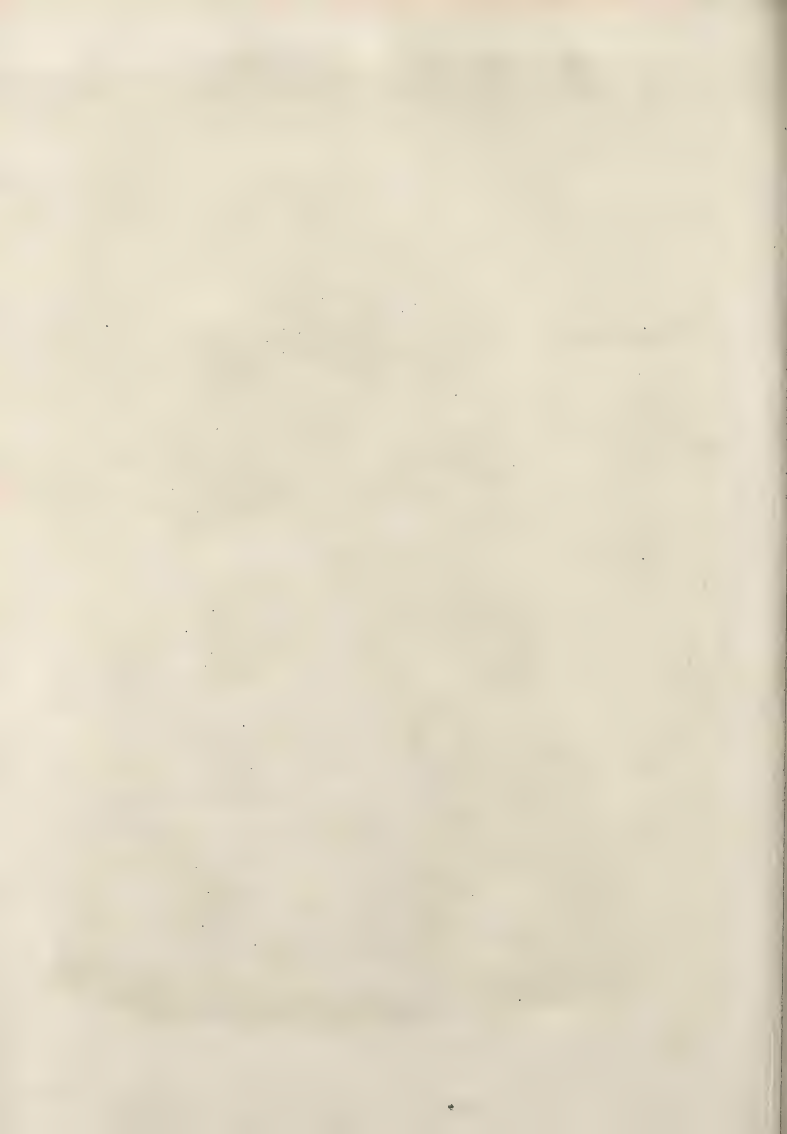


Fig. 2.
pair cut of Fig. 1.





Plant.

The quantity perspired by different plants, however, is by no means equal. A vine-leaf perspires only $\frac{1}{100}$ of an inch in 12 hours; a cabbage perspires $\frac{1}{10}$ of an inch in the same time; an apple-tree $\frac{1}{100}$ in 12 hours; and a lemon $\frac{1}{100}$ in 12 hours.

Of the Circulation of the Sap in Plants.—Concerning this there have been great disputes; some maintaining, that the vegetable sap has a circulation analogous to the blood of animals; while others affirm, that it only ascends in the day-time, and descends again in the night. In favour of the doctrine of circulation it has been urged, that upon making a transverse incision into the trunk of a tree, the juice which runs out, proceeds in greater quantity from the upper than the lower part; and the swelling in the upper lip is also much greater than in the lower. It appears, however, that when two similar incisions are made, one near the top, and the other near the root, the latter expends much more sap than the former. Hence it is concluded, that the juice ascends by one set of vessels, and descends by another. But, in order to shew this clearly, it would be necessary, first to prove, that there is in plants, as in animals, some kind of centre from which the circulation begins, and to which it returns: but no such centre has been discovered by any naturalist; neither is there the least provision apparently made by nature whereby the sap might be prevented from descending in the very same vessels thro' which it ascends. In the lacteal vessels of animals, which we may suppose to be analogous to the roots of vegetables, there are valves which effectually prevent the chyle when once absorbed from returning into the intestines; but no such thing is observed in the vessels of vegetables; whence it must be very probable, that when the propelling force ceases, the juice descends by the very same vessels through which it ascended. This matter, however, has been cleared up almost as well as the nature of the subject will admit of by the experiments of Dr Hales †. These experiments are so numerous, that for a particular account of them we must refer to the work itself; however, his reasoning against the circulation of the sap will be sufficiently intelligible without them. “We see, (says he), in many of the foregoing experiments, what quantities of moisture trees daily imbibe and perspire: now the celerity of the sap must be very great, if that quantity of moisture must, most of it, ascend to the top of the tree, then descend, and ascend again, before it is carried off by perspiration.

“The defect of a circulation in vegetables seems in some measure to be supplied by the much greater quantity of liquor, which the vegetable takes in, than the animal, whereby its motion is accelerated; for we find the sun-flower, bulk for bulk, imbibes and perspires 17 times more fresh liquor than a man, every 24 hours.

“Besides, Nature's great aim in vegetables being only that the vegetable life be carried on and maintained, there was no occasion to give it the rapid motion which was necessary for the blood of animals.

“In animals, it is the heart which sets the blood in motion, and makes it continually circulate; but in vegetables we can discover no other cause of the sap's motion, but the strong attraction of the capillary sap-

Plant.

vessels, assisted by the brisk undulations and vibrations caused by the sun's warmth, whereby the sap is carried up to the top of the tallest trees, and is there perspired off thro' the leaves: but when the surface of the tree is greatly diminished by the loss of its leaves, then also the perspiration and motion of the sap is proportionably diminished, as is plain from many of the foregoing experiments: so that the ascending velocity of the sap is principally accelerated by the plentiful perspiration of the leaves, thereby making room for the fine capillary vessels to exert their vastly attracting power, which perspiration is effected by the brisk rarefying vibrations of warmth; a power that does not seem to be any ways well adapted to make the sap descend from the tops of vegetables by different vessels to the root.

“If the sap circulated, it must needs have been seen descending from the upper part of large gashes cut in branches set in water, and with columns of water pressing on their bottoms in long glass tubes. In both which cases, it is certain that great quantities of water passed through the stem, so that it must needs have been seen descending, if the return of the sap downwards were by trusion or pulsion, whereby the blood in animals is returned through the veins to the heart: and that pulsion, if there were any, must necessarily be exerted with prodigious force, to be able to drive the sap through the finer capillaries. So that, if there be a return of the sap downwards, it must be by attraction, and that a very powerful one, as we may see by many of these experiments. But it is hard to conceive, what and where that power is, which can be equivalent to that provision nature has made for the ascent of the sap in consequence of the great perspiration of the leaves.

“The instances of the jessamine-tree, and of the passion-tree, have been looked upon as strong proofs of the circulation of the sap, because their branches, which were far below the inoculated bud, were gilded: but we have many visible proofs in the vine, and other bleeding trees, of the sap's receding back, and pushing forwards alternately, at different times of the day and night. And there is great reason to think, that the sap of all other trees has such an alternate, receding, and progressive motion, occasioned by the alternacies of day and night, warm and cool, moist and dry.

“For the sap in all vegetables does probably recede in some measure from the tops of the branches, as the sun leaves them; because its rarefying power then ceasing, the greatly rarefied sap, and air mixed with it, will condense, and take up less room than they did, and the dew and rain will then be strongly imbibed by the leaves; whereby the body and branches of the vegetable which have been much exhausted by the great evaporation of the day, may at night imbibe sap and dew from the leaves; for by several experiments, plants were found to increase considerably in weight, in dewy and moist nights. And by other experiments on the vine, it was found, that the trunk and branches of vines were always in an imbibing state, caused by the great perspiration of the leaves, except in the bleeding season; but when at night that perspiring power ceases, then the contrary imbibing power will prevail, and draw the sap and dew from the leaves, as well

Vegetable
Statistics,
vol. i.
p. 142.

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well as moisture from the roots.

"And we have a farther proof of this by fixing mercurial gages to the stems of several trees which do not bleed, whereby it is found that they are always in a strongly imbibing state, by drawing up the mercury several inches: whence it is easy to conceive, how some of the particles of the gilded bud in the inoculated jessamine may be absorbed by it, and thereby communicate their gilding miasma to the sap of other branches; especially when, some months after the inoculation, the stock of the inoculated jessamine is cut off a little above the bud; whereby the stock, which was the counteracting part to the stem, being taken away, the stem attracts more vigorously from the bud.

"Another argument for the circulation of the sap, is that some sorts of the grafts will infect and canker the stocks they are grafted on: but by mercurial gages fixed to fresh-cut stems of trees, it is evident that those stems were in a strongly imbibing state; and consequently the cankered stocks might very likely draw sap from the graft, as well as the graft alternately from the stock; just in the same manner as leaves and branches do from each other, in the vicissitudes of day and night. And this imbibing power of the stock is so great, where only some of the branches of a tree are grafted, that the remaining branches of the stock will, by their strong attraction, starve those grafts; for which reason it is usual to cut off the greatest part of the branches of the stock, leaving only a few small ones to draw up the sap.

"The instance of the ilex grafted upon the English oak, seems to afford a very considerable argument against a circulation. For, if there were a free uniform circulation of the sap through the oak and ilex, why should the leaves of the oak fall in winter, and not those of the ilex?

"Another argument against an uniform circulation of the sap in trees, as in animals, may be drawn from an experiment where it was found by the three mercurial gages fixed to the same vine, that while some of its branches changed their state of protruding sap into a state of imbibing, others continued protruding sap one nine, and the other thirteen days longer."

To this reasoning of Dr Hales we shall subjoin an experiment made by Mr Muffel of the Academy of Sciences at Rouen, which seems decisive against the doctrine of circulation. His account of it is as follows.—"On the 12th of January I placed several shrubs in pots against the windows of my hot-house, some within the house, and others without it. Thro' holes made for this purpose in the panes of glass, I passed a branch of each of the shrubs, so that those on the inside had a branch without, and those on the outside one within; after this, I took care that the holes should be exactly closed and luted. This inverse experiment, I thought, if followed closely, could not fail affording sufficient points of comparison, to trace out the differences, by the observation of the effects.

"The 20th of January, a week after this disposition, all the branches that were in the hot-house began to disclose their buds. In the beginning of February there appeared leaves; and towards the end of it, shoots of a considerable length, which presented the young flowers. A dwarf apple-tree, and several

Plant.

rose-trees, being submitted to the same experiment, shewed the same appearance then as they commonly put on in May; in short, all the branches which were within the hot-house, and consequently kept in the warm air, were green at the end of February, and had their shoots in great forwardness. Very different were those parts of the same tree which were without and exposed to the cold. None of these gave the least sign of vegetation; and the frost, which was intense at that time, broke a rose-pot placed on the outside, and killed some of the branches of that very tree which, on the inside, was every day putting forth more and more shoots, leaves, and buds, so that it was in full vegetation on one side, whilst frozen on the other.

"The continuance of the frost occasioned no change in any of the internal branches. They all continued in a very brisk and verdant state, as if they did not belong to the tree which, on the outside, appeared in the state of the greatest suffering. On the 15th of March, notwithstanding the severity of the season, all was in full bloom. The apple-tree had its root, its stem, and part of its branches, in the hot-house. These branches were covered with leaves and flowers; but the branches of the same tree, which were carried on the outside, and exposed to the cold air, did not in the least partake of the activity of the rest, but were absolutely in the same state which all trees are in during winter. A rose-tree, in the same position, showed long shoots with leaves and buds; it had even shot a vigorous branch upon its stalk; whilst a branch which passed through, to the outside, had not begun to produce anything, but was in the same state with other rose-trees left in the ground. This branch is four lines in diameter, and 18 inches high.

"The rose-tree on the outside was in the same state; but one of its branches drawn through to the inside of the hot-house, was covered with leaves and rose-buds. It was not without astonishment that I saw this branch shoot as briskly as the rose-tree which was in the hot-house, whose roots and stalk, exposed as they were to the warm air, ought, it should seem, to have made it get forwarder than a branch belonging to a tree, whose roots, trunk, and all its other branches, were at the very time frost-nipped. Notwithstanding this, the branch did not seem affected by the state of its trunk; but the action of the heat upon it produced the same effect, as if the whole tree had been in the hot-house.

g. *Of the Food of PLANTS.*—This hath been so fully discussed under the article AGRICULTURE †, that it † Part I. remains here only to take notice of those discoveries ^{sect. 1.} which have been made since that article was written.—The method of making dephlogisticated *air de novo*, or of depriving common air of its phlogiston, is now so much improved, that numberless experiments may be made with it both on animals and vegetables. It is now pretty clear, that these two parts of the creation are a kind of counterbalance to one another; and the noxious parts or excrements of the one prove salutary food to the other. Thus, from the animal body continually pass off certain effluvia, which *phlogificate* the air. Nothing can be more prejudicial to animal life than an accumulation of these effluvia: on the other hand, nothing is more favourable to vegetables than those excrementitious effluvia of animals; and accordingly

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cordingly they greedily absorb them from the earth, or from the air. With respect to the excrementitious parts of living vegetables, the case is reversed. The purest deplogificated air is the common effluvia which passes off from vegetables; and this, however favourable to animal life, is by no means so vegetable; whence we have an additional proof of the doctrine concerning the food of plants delivered under the article AGRICULTURE.

With regard to the effects of other kinds of air on vegetation, a difference of some consequence took place between Dr Priestley and Dr Percival. The former, in the first volume of his Experiments and Observations on Air, had asserted that fixed air is fatal to vegetable as well as to animal life. This opinion, however, was opposed by Dr Percival, and the contrary one adopted by Dr Hunter of York in the Geographical Essays, vol. V. The experiments related by these two gentlemen would indeed have been decisive, had they been made with sufficient accuracy. That this was the case, however, Dr Priestley denies, and in the third volume of his Treatise on Air has fully detected the mistakes in Dr Percival's experiments; which proceeded in fact from his having used, not fixed air, but common air mixed with a small quantity of fixed air. His experiments, when repeated with the purest fixed air, and in the most careful manner, were always attended with the same effect, namely, the killing of the plant.

It had also been asserted by Drs Percival and Hunter, that water impregnated with fixed air was more favourable to vegetation than simple water. This opinion was likewise examined by Dr Priestley: however, his experiments were indecisive; but seem rather unfavourable to the use of fixed air than otherwise.

Another very remarkable fact with regard to the food of plants has been discovered by Dr Priestley; namely, that some of them, such as the willow, comfrey, and duck-weed, are nourished by inflammable air. The first, he says, flourishes in this species of air so remarkably, that, "it may be said to feed upon it with great avidity. This process terminates in the change of what remains of the inflammable air into phlogificated air, and sometimes into a species of air as good as common air, or even better; so that it must be the *inflammable principle* in the air that the plant takes, converting it, no doubt, into its proper nourishment."

From what has been said under the article PHLOGISTON, it must appear evident, that phlogificated air and inflammable air are closely allied to each other, so that it is no wonder they should serve promiscuously for the food of plants. The reason why both are not agreeable to all kinds of plants: most probably is the different quantity of phlogistic matter contained in them, and the different action of the latent fire they contain: for all plants do not require an equal quantity of nourishment; and such as require but little, will be destroyed by having too much. The action of heat also is essentially necessary to vegetation, and it is probable that very much of this principle is absorbed from the air by vegetables. But if the air by which plants are partly nourished contains too much of that principle, it is very probable that they may be

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destroyed from this cause as well as the other; and thus inflammable air, which contains a vast quantity of that active principle, may destroy such plants as grow in a dry soil, though it preserves those which grow in a wet one. See VEGETATION.

Diffeminatio of PLANTS.—So great are the prolific powers of the vegetable kingdom, that a single plant almost of any kind, if left to itself would, in a short time, over-run the whole world. Indeed, supposing the plant to have been only a single annual, with two seeds, it would, in 20 years, produce more than a million of its own species; what numbers then must have been produced by a plant whose seeds are so numerous as many of those with which we are acquainted? From a single root of the helianthus (bathard sun-flower), Laurembergius reckons 3000 seeds; from the zea, 2000; which in Virginia must be doubled, because the plant is there sown twice a year. In the helianthus (sun-flower), 4000 seeds were observed by Camerarius; and in a poppy, Trevins numbered 3200 seeds: but of all others the tobacco seems to produce the greatest number of seeds, 40320 being counted from a single plant.

If nature had appointed no means for the scattering of these numerous seeds, but allowed them to fall down in the place where they grew, the young vegetables must of necessity have choked one another as they grew up, and not a single plant could have arrived at perfection. But so many ways are there appointed for the diffeminatio of plants, that we not only see they not hinder each others growth, but a single plant will in a short time spread through different countries. The most evident means for this purpose are,

1. The force of the air.—That the efficacy of this may be the greater, nature has raised the seeds of vegetables upon stalks, so that the wind has thus an opportunity of acting upon them with the greater advantage. The seed-capsules also open at the apex, lest the ripe seeds should drop out without being widely dispersed by the wind. Others are furnished with wings, and a pappous down, by which, after they come to maturity, they are carried up into the air, and have been known to fly the distance of 50 miles: 138 genera are found to have winged seeds.

2. In some plants the seed-vessels open with violence when the seeds are ripe, and thus throw them to a considerable distance; and we have an enumeration of 50 genera whose seeds are thus dispersed.

3. Other seeds are furnished with hooks, by which, when ripe; they adhere to the coats of animals, and are carried by them to their lodging places. Linnæus reckons 50 genera armed in this manner.

4. Many seeds are dispersed by means of birds, and other animals; who pick up the berries, and afterwards eject the seeds uninjured. Thus the fox disseminates the privet, and man many species of fruit. The plants found growing upon walls and houses, on the tops of high rocks, &c. are mostly brought there by birds; and it is universally known, that by manuring a field with new dung, innumerable weeds will spring up, which did not exist there before: 193 species are reckoned up which may be disseminated in this manner.

5. The growth of other seeds is promoted by ani-

Plant

Priestley on
Air, vol. v.
p. 2.

Plant.

imals in a different way. While some are eaten, others are scattered and trodden into the ground by them. The squirrel gnaws the cones of the pine, and many of the seeds fall out. When the locust eats off their bark, almost his only food, many of their seeds are committed to the earth, or mixed in the morafs with mofs, where he had retired. The glandularia, when she hides up her nuts, often forgets them, and they strike root. The same is observable of the walnut; mice collect and bury great quantities of them, and being afterwards killed by different animals, the nuts germinate.

6. We are astonished to find mosses, fungi, byssus, and mucor, growing every-where; but it is for want of reflecting that their seeds are so minute that they are almost invisible to the naked eye. They float in the air like atoms, and are dropped every-where, but grow only in those places where there was no vegetation before, and hence we find the same mosses in North America and in Europe.

7. Seeds are also dispersed by the ocean, and by rivers. "In Lapland, (says Linnæus), we see the most evident proofs how far rivers contribute to deposit the seeds of plants. I have seen Alpine plants growing upon their shores frequently 36 miles distant from the Alps; for their seeds falling into the rivers, and being carried along and left by the stream, take root there.—We may gather likewise from many circumstances how much the sea furthers this business.—In Røslagia, the island of Græfœa, Oeland, Gothland, and the shores of Scania, there are many foreign and German plants not yet naturalized in Sweden. The centaury is a German plant, whose seeds being carried by the wind into the sea, the waves landed this foreigner upon the coasts of Sweden. I was astonished to see the veronica maritima, a German plant, growing at Tornea, which hitherto had been found only in Græfœa: the sea was the vehicle by which this plant was transported thither from Germany; or possibly it was brought from Germany to Græfœa, and from thence to Tornea. Many have imagined, but erroneously, that seed corrupts in water, and loses its principle of vegetation. Water at the bottom of the sea is seldom warm enough to destroy seeds; we have seen water cover the surface of a field for a whole winter, while the seed which it contained remained unburt, unless at the beginning of spring the waters were let down so low by drains, that the warmth of the sun-beams reached to the bottom. Then the seeds germinate, but presently become putrescent; so that for the rest of the year the earth remains naked and barren. Rain and showers carry seeds into the cracks of the earth, streams, and rivers; which last, conveying them to a distance from their native places, plant them in a foreign soil."

8. Lastly, some seeds assist their projection to a distance in a very surprising manner. The crupina, a species of centaury, has its seeds covered over with erect bristles, by whose assistance it creeps and moves about in such a manner, that it is by no means to be kept in the hand. If you confine one of them between the stocking and the foot, it creeps out either at the sleeve or neck-band, travelling over the whole body. If the bearded oat, after harvest, be left with other grain in the barn, it extricates itself from the glume,

nor does it stop in its progress till it gets to the walls of the building. Hence, says Linnæus, the Date-carian, after he has cut and carried it into the barn, in a few days finds all the glumes empty, and the oats separate from them; for every oat has a spiral arista or beard annexed to it, which is contracted in wet, and extended in dry weather. When the spiral is contracted, it drags the oat along with it: the arista being bearded with minute hairs pointing downward, the grain necessarily follows it; but when it expands again, the oat does not go back to its former place, the roughness of the beard the contrary way preventing its return. If you take the seeds of equisetum, or fern, these being laid upon paper, and viewed in a microscope, will be seen to leap over any obstacle as if they had feet; by which they are separated and dispersed one from another; so that a person ignorant of this property, would pronounce these seeds to be so many mites or small insects. See NATURAL History, Sect. III.

PLANTS growing on Animals. See INSECTS giving root to Plants.

Method of Drying and Preserving PLANTS for Botany. Many methods have been devised for the preservation of plants; we shall relate only those that have been found most successful.

First prepare a press, which a workman will make by the following directions. Take two planks, of a wood not liable to warp. The planks must be two inches thick, 18 inches long, and 12 inches broad. Get four male and four female screws, such as are commonly used for securing sash-windows. Let the four female screws be let into the four corners of one of the planks, and corresponding holes made through the four corners of the other plank for the male screws to pass through, so as to allow the two planks to be screwed tightly together. It will not be amiss to face the bearing of the male screws upon the wood with iron plates; and if the iron plates went across from corner to corner of the wood, it would be a good security against the warping.

Secondly, get half a dozen quires of large soft spongy paper, such as the stationers call *blossom blotting paper* is the best, and a few sheets of strong paste-board.

The plants you wish to preserve should be gathered in a dry day, after the sun hath exhale the dew; taking particular care to collect them in that state where in their generic and specific characters are most conspicuous. Carry them home in a tin-box nine inches long, four inches and a half wide, and one inch and a half deep. Get the box made of the thinnest tinned iron that can be procured; and let the lid open upon hinges. If any thing happens to prevent the immediate use of the specimens you have collected, they will be kept fresh two or three days in this box much better than by putting them in water. When you are going to preserve them, suffer them to lie upon a table until they become limber; and then they should be laid upon a pasteboard, as much as possible in their natural form, but at the same time with a particular view to their generic and specific characters. For this purpose it will be advisable to separate one of the flowers, and to display the generic character. If the specific character depends upon the flower or upon the

root;

Withering
Botanical
Arrangement,
P. xlviii.

Plant.

Angril.
Academ.

Plant.

root, a particular display of that will be likewise necessary. When the plant is thus disposed upon the pasteboard, cover it with eight or ten layers of spongy paper, and put it into the press. Exert only a small degree of pressure for the first two or three days; then examine it, unfold any unnatural plaits, rectify any mistakes, and, after putting fresh paper over it, screw the press harder. In about three days more separate the plant from the pasteboard, if it is sufficiently firm to allow of a change of place; put it upon a fresh pasteboard, and, covering it with fresh blossom-paper, let it remain in the press a few days longer. The press should stand in the sun-shine, or within the influence of a fire.

When it is perfectly dry, the usual method is to fasten it down, with paste or gum-water, on the right-hand inner page of a sheet of large strong writing-paper. It requires some dexterity to glue the plant neatly down, so that none of the gum or paste may appear to defile the paper. Press it gently again for a day or two, with a half sheet of blossom-paper betwixt the folds of the writing-paper. When it is quite dry, write upon the left-hand inner page of the paper the name of the plant; the specific character; the place where, and the time when, it was found; and any other remarks you may think proper. Upon the back of the same page, near the fold of the paper, write the name of the plant, and then place it in your cabinet. A small quantity of finely powdered arsenic, or corrosive sublimate, is usually mixed with the paste or gum-water, to prevent the devastations of insects; but the seeds of slaves-acre finely powdered will answer the same purpose, without being liable to corrode or to change the colour of the more delicate plants. Some people put the dried plants into the sheets of writing-paper, without fastening them down at all; and others only fasten them by means of small slips of paper, pasted across the stem or branches. Where the species of any genus are numerous, and the specimens are small, several of them may be put into one sheet of paper.

Another more expeditious method is to take the plants out of the press after the first or second day; let them remain upon the pasteboard; cover them with five or six leaves of blossom-paper, and iron them with a hot smoothing-iron until they are perfectly dry. If the iron is too hot, it will change the colours; but some people, taught by long practice, will succeed very happily. This is quite the best method to treat the orchis and other slimy mucilaginous plants.

Another method is to take the plants when fresh gathered, and, instead of putting them into the press, immediately to fasten them down to the paper with strong gum-water: then dip a camel-hair pencil into spirit-varnish, and varnish the whole surface of the plant two or three times over. This method succeeds very well with plants that are readily laid flat, and it preserves their colours better than any other. The spirit varnish is made thus. To a quart of highly rectified spirit of wine, put five ounces of gum sandarach; two ounces of mastic in drops; one ounce of pale gum elemi, and one ounce of oil of spike-lavender. Let it stand in a warm place, and shake it frequently to expedite the solution of the gums.

Where no better convenience can be had, the spe-

cimens may be disposed systematically in a large folio book; but a vegetable cabinet is upon all accounts more eligible. In Plate CCXLVI, there is a section of a cabinet, in the true proportions it ought to be made, for containing a complete collection of British plants. By the assistance of this drawing, and the adjoining scale, a workman will readily make one. The drawers must have backs and sides, but no other front than a small ledge. Each drawer will be 14 inches wide, and 10 inches from the back to the front, after allowing half an inch for the thickness of the two sides, and a quarter of an inch for the thickness of the back. The sides of the drawers, in the part next the front, must be sloped off in a serpentine line, something like what the workmen call an *ogee*. The bottoms of the drawers must be made to slide in grooves cut in the uprights, so that no space may be lost betwixt drawer and drawer. After allowing a quarter of an inch for the thickness of the bottom of each drawer, the clear perpendicular space in each must be as in the following table.

I. Two tenths of an inch.	XIV. Three inches and eight tenths.
II. One inch and two tenths.	XV. Three inches and four tenths.
III. Four inch, and six tenths.	XVI. One inch and three tenths.
IV. Two inches and three tenths.	XVII. Two inches and eight tenths.
V. Seven inches and eight tenths.	XVIII. Six tenths of an inch.
VI. Two inches and two tenths.	XIX. Ten inches.
VII. Two tenths of an inch.	XX. One inch and nine tenths.
VIII. One inch and four tenths.	XXI. Four inches and four tenths.
IX. Two tenths of an inch.	XXII. Two inches and six tenths.
X. Two inches and eight tenths.	XXIII. One inch and two tenths.
XI. One inch and two tenths.	XXIV. Seventeen inches.
XII. Three inches and five tenths.	
XIII. Two inches and four tenths.	

This cabinet shuts up with two doors in front; and the whole may stand upon a base, containing a few drawers for the reception of duplicates and papers.

Moving PLANT. See HEDYSARUM.

Sensitive PLANT. See MIMOSA and SENSITIVE PLANT.

PLANT-Lice, Vine-fretters, or Pucerons. See APHIS.

PLANTA, a PLANT. See PLANT.

PLANTA Feminæ, a female plant, is one which bears female flowers only. It is opposed to a *male plant*, which bears only male flowers; and to an *androgynous* one, which bears flowers of both sexes.—Female plants are produced from the same feed with the male, and arrange themselves under the class of diœcia in the sexual method.

PLANTAGENET, the surname of the kings of England from Henry II. to Richard III. inclusive. Antiquarians are much at a loss to account for the origin of this name; and the best derivation they can find for it is, that Fulk, the first earl of Anjou of that name, being stung with remorse for some wicked action, went in pilgrimage to Jerusalem as a work of atonement; where being soundly scourged with broom-twigs, which grew plentifully on the spot, he ever after took the surname of *Plantagenet*, or *broom stalk*, which was retained by his noble posterity.

PLANTAGO, PLANTAIN; a genus of the monogynia order, belonging to the tetrandria class of plants. To this genus Linnæus has joined the coronopus

Plant

Plantago.

Plantago and *psyllium* of Tournefort. The first of these is called *harts-horn*, the latter *seawort*. Of these there are several distinct species, and some varieties; but as they are rarely cultivated in gardens, we shall not enumerate them here, and shall only mention such of them as grow naturally in Britain. Of the plantain there are the following sorts: The common broad-leaved plantain, called *weybread*; the great hoary plantain, or *lambs-tongue*; the narrow-leaved plantain, or *ribwort*; and the following varieties have also been found in England, which are accidental; the *before-plantain* and *rose-plantain*. The plantains grow naturally in pastures in most parts of England, and are frequently very troublesome weeds. The common plantain, and *ribwort* plantain, are both used in medicine, and are so well known as to need no description. They are said to be slightly astringent; and the green leaves are commonly applied to fresh wounds by the common people.

Of the *coronopus*, or *buffhorn* plantain, there are two varieties growing in England, viz. the common *buffhorn*, which grows plentifully on heaths every where; and the narrow-leaved *Welch* sort, which is found upon many of the *Welch* mountains. The first of these was formerly cultivated as a salad herb in gardens, but has been long banished from thence for its rank disagreeable flavour; it is sometimes used in medicine.—There has been one species of *psyllium* or *seawort* found growing naturally in England, which is the sort used in medicine. This was found in the earth thrown out of the bottom of the canals which were dug for the *Chelsea* water-works, where it grew in great plenty. The seeds of this must have been buried there some ages; for no person remembers any of the plants growing in that neighbourhood before. The seeds of this are sometimes used, which are imported from the south of France.

PLANTAIN. See *FRANCAGO*.

PLANTAIN Tree. See *MUSA*.

PLANTATION, in the West Indies, denotes a spot of ground which a planter, or person arrived in a new colony, pitches on to cultivate for his own use, or is assigned for that purpose. However, the term *plantation* is often used in a term synonymous with *colony*. See *COLONY*.

PLANTERSHIP, in a general sense, the business of a planter.

PLANTERSHIP, in the West Indies, denotes the management of a sugar plantation, including not only the cultivation of the cane, but the various processes for the extraction of the sugar, together with the making of *sugar-spirits*. See *RUM*, *SACCHARUM*, and *SUGAR*.

To effect a design so comprehensive, it is necessary for a planter to understand every branch of the art precisely, and to use the utmost attention and caution both in the laying down and executing of his plans. It is therefore the duty of a good planter to inspect every part of his plantation with his own eyes; to place his provisions, stores, and utensils, in regular order, and in safe repositories; that by preserving them in perfection, all kinds of waste may be prevented.

But as negroes, cattle, mules, and horses, are, as it were, the nerves of a sugar-plantation, it is expedient to treat that subject with some accuracy.

[*Of Negroes, Cattle, &c.*] In the first place, then, as it

is the interest of every planter to preserve his negroes in health and strength; so every act of cruelty is not less repugnant to the master's real profit, than it is contrary to the laws of humanity: and if a manager considers his own ease, and his employer's interest, he will treat all negroes under his care with due benevolence; for good discipline is by no means inconsistent with humanity: on the contrary, it is evident from experience, that he who feeds his negroes well, proportions their labour to their age, sex, and strength, and treats them with kindness and good-nature, will reap a much larger product, and with infinitely more ease and self-satisfaction, than the most cruel task-master, who starves his negroes, or chastises them with undue severity. Every planter then who wishes to grow rich with ease, must be a good economist; must feed his negroes with the most wholesome food, sufficient to preserve them in health and vigour. Common experience points out the methods by which a planter may preserve his people in health and strength. Some of his most fruitful land should be allotted to each negro in proportion to his family, and a sufficient portion of time allowed for the cultivation of it; but because such allotment cannot in long droughts produce enough for his comfortable support, it is the incumbent duty of a good planter to have always his stores well filled with *Guinea* corn, yams, or eddoes, besides potatoes growing in regular succession: for plenty begets cheerfulness of heart, as well as strength of body; by which more work is effected in a day by the same hands, than in a week when enervated by want and severity. Scanty meals may sustain life; but it is evident, that more is requisite to enable a negro, or any other person, to go through the necessary labours. He therefore who will reap plentifully, must plant great abundance of provisions as well as sugar-canes: and it is nature's economy so to fructify the soil by the growth of yams, plantains, and potatoes, as to yield better harvests of sugar, by that very means, than can be produced by many other arts of cultivation. Plantains are the principal support of all the negroes at *Jamaica*; and are also much cultivated, at great expence of manure, in *Barbadoes*; but ought not to be solely depended upon in climates subject to hurricanes. A celebrated planter and economist of the last-mentioned island, who raised an immense fortune from very small beginnings only by planting, affirmed, that he fed constantly at least 300 negroes out of 12 acres of plantains. How that excellent produce came to be so long neglected in some of the islands, is hard to guess; but at present the neglect seems to be founded upon a vulgar error, that plantains cannot thrive in any other than low moist soils. In such places (no doubt) they flourish most luxuriantly; but yet they thrive and bear fruit abundantly on mountains and in marshes, and in the driest black mold upon marble or rocks, and even in sharp gravelly soils, as may be evinced by numberless instances.

However plenty of wholesome food may be conducive to health, there are also other means, equally necessary to strength and the longevity of negroes, well worth the planter's attention: and those are, to choose airy dry situations for their houses; and to observe frequently that they be kept clean, in good repair, and perfectly water-tight; for nastiness, and the inclemencies of weather, generate the most malignant diseases.

Planter^{ship}. If these houses are situated also in regular order, and at due distances, the spaces may at once prevent general devastations by fire, and furnish plenty of fruits and pot-herbs, to please an unvitiated palate, and to purify the blood. Thus then ought every planter to treat his negroes with tenderness and generosity, that they may be induced to love and obey him out of mere gratitude, and become real good beings by the imitation of his behaviour; and therefore a good planter, for his own ease and happiness, will be careful of setting a good example.

Having thus hinted the duties of a planter to his negroes, let the next care be of cattle, mules, and horses. The planters of Barbadoes (who are perhaps the most skilful of all others, and exact to a nicety in calculations of profit and loss) are, with respect to their cattle, the most remiss of any in all the islands; as if the carriage of canes to the mill, and of plantation-produce to the market, was not as essential as any other branch of planter^{ship}. At Barbadoes, in particular, the care of these animals is of more importance; because the soil, worn out by long culture, cannot yield any produce without plenty of dung. Some planters are nevertheless so ingeniously thrifty, as to carry their canes upon negroes heads; acting in that respect diametrically opposite to their own apparent interest, which cannot be served more effectually than by saving the labour of human hands, in all cases where the labour of brutes can be substituted; and for that end, no means of preserving those creatures in health and strength ought to be neglected.

The first care therefore is to provide plenty and variety of food. In crop-time, profusion of cane-tops may be had for the labour of carriage; but they will be more wholesome and nutritious if tedded like hay by the sun's heat, and sweated by laying them in heaps a few days before they are eaten. In this season of abundance, great ricks of cane-tops (the butt ends turned inwards) should be made in the most convenient corner of each field, to supply the want of pasturage and other food: and these are very wholesome if chopped into small parts, and mixed sometimes with common salt, or sprinkled with melasses mixed with water; but yet the cattle require change of food to preserve them in strength; such as Guinea corn, and a variety of grass, which every soil produces with a little care in moist weather; and indeed this variety is found necessary in all climates.

But since that variety is not to be had during those severe droughts to which hot climates are liable, and much less in those small islands which cannot furnish large tracts of meadow-lands for hay, the only resource is the fodder of cane-tops or tedded Guinea-corn leaves; which are very nutritious, and may be preserved in perfection for more than a whole year, provided the tops or Guinea-corn are well tedded for three or four hot days as they lie spread in the field; and then, being tied into bundles or sheaves, must lie in the hot sun for three or four days more, when they may be fit to be put up into ricks. The best method of making them is in an oblong figure, about 30 feet in length, and 16 or 18 feet wide; seven feet high at the sides, and from thence sloping like the roof of an house, the ridge of which must be thatched very carefully; for the sides may be secured from wet

by placing the bundles with the butts upwards towards the ridge, in courses, and lapping the upper over the lower course.

The best method of forming those ricks, is to place the first course of bundles all over the base one way; the second course reverse; and so alternately till the rick be finished.

When cattle are to be fed with this fodder, it must be observed to take down the bundles from the top, at the west end of the rick, to the bottom; for all these ricks must stand east and west lengthwise, as well to secure them from being overturned by high winds, as for the convenience of preserving them from wet, which cannot be done when ricks are made round. By this husbandry, an herd of cattle may be kept in strength, either in severe droughts, or in wet seasons, when grass is purgative: and thus the necessity or expence of large pastures may be totally saved. The hay-knife used in England for cutting hay, answers for cutting ricks of tops.

The method of tedding Guinea-corn to make a kind of hay, will require a little explanation here. When Guinea corn is planted in May, and to be cut down in July, in order to bear seed that year, that cutting, tedded properly, will make an excellent hay, which cattle prefer to meadow-hay. In like manner, after Guinea corn has done bearing seed, the after-crop will furnish a great abundance of that kind of fodder which will keep well in ricks for two or three years.

The next care of a planter is to provide shade for his cattle; either by trees where they are fed in the heat of the day, if his soil requires not dung; or by building a flat shade over the pen where cattle are confined for making it. That such shades are essentially necessary to the well being of all animals in hot weather, is apparent to every common observer, who cannot fail of seeing each creature forsaking the most luxuriant pastures in the heat of the day, for the sake of shade; thus convincing the owners by instinctive argument, that shade is almost as necessary to the well-being of the brute creatures, as food. Yet, notwithstanding that demonstration from the unerring course of nature, throughout all our islands (except in a very few instances) these poor creatures are exposed to the scorching sun-beams without mercy. Such inhuman neglect is not always so much the effect of inattention, as of a mistaken notion that shades are impidental to the making of much dung; but a flat shade covered with cane-trash, may be so made as to let rain pass through it, without admission of sun-beams. This will do for cattle; but mules, which are spirited creatures, and work themselves by draught into a foaming heat, should be put into a warm stable, until quite cool: for turning them loose to pasture when so hot, is probably the cause of their destruction by the glanders.

If the care of providing shade for brute creatures is so much the duty and interest of their owners, how much more is it agreeable to the laws of humanity to provide shade for human creatures travelling upon the high roads in this hot climate? Nothing surely of so much beauty, costs so little expence as planting cocoanut or spreading timber trees in avenues along the high-ways, if each proprietor of the lands adjoining hath any taste of elegance, or feeling for other men: but both those kinds of trees will yield also great profit to the

Planterſhip. the proprietor, by furniſhing him with timber, when perhaps not otherwiſe to be had; or with a delicious milk, fitted by nature to cool the efferveſcence of the blood in this hot region; and alſo to improve the ſpirits made from ſugar to the delicacy and ſoftneſs of arrack. Cocoa-nut, and cabbage trees are both very beautiful and ſhady, bearing round heads of great expanſion, upon natural trunks, or pillars of elegant proportion, and of ſuch an height as to furniſh a large ſhade, with a free circulation of air equally reſreſhing to man and beaſt.

The common objection of injury to canes by the roots of ſuch trees growing on their borders, may be eaſily removed by digging a ſmall trench between the canes and trees, which may intercept their roots, and oblige them to ſeek ſuſtenance in the common road: Let it alſo be conſidered, beſides the benefits above ſuggeſted, that the planter will thus beautify his eſtate to the reſemblance of a moſt ſumptuous garden. And probably that very beauty might not only render the iſlands more healthful to the inhabitants, by preſerving them from fevers kindled by the burning fun-beams, but alſo much more fruitful by ſeaſonable weather: for as, by cutting down all its woods, an hot country becomes more ſubject to exceſſive droughts; ſo by replanting it in the manner above deſcribed, it would probably become more ſeaſonable.

Let then the planter be kind not only to his fellow-creatures, but merciful to his beaſts; giving them plenty and variety of wholeſome food, clear water, cool ſhade, and a clean bed, bleeding them after a long conſe of hard labour, currying their hides from filth and ticks (A); affording them ſalt, and other phyſic, when neceſſary; protecting them from the ſlaying rope-lafes of a cruel driver (who needs no other inſtrument than a goad); proportioning their labour to their ſtrength; and by every art rendering their work as eaſy as poſſible. The general management of planters is not, perhaps, more defective in any other reſpect than in this: for, by pairing the cattle unequally, and by the drivers ill conduct in writhing to the right and left, the poor creatures are fatigued by needleſs labour. An horſe ought therefore to be harneſſed before them as a leader. This docile creature, by being led in a ſtraight line, will ſoon learn to be an unerring guide, and the cattle will follow in the ſame direction with united ſtrength, and conſequently with more effect and leſs fatigue to each individual.

The Portugueſe of Madeira, by their poverty and ſcantineſs of paſture, breed the ſmalleſt kind of cattle; and yet one yoke of them will draw a much greater weight than a pair of our largeſt oxen, ſolely by an equal exertion of their joint ſtrength. That equality or evenneſs of draught is preſerved by boring gimblet holes through their horns, within two inches of the points, and running a thong of leather through thoſe holes, ſo as to tie the horns of each pair at ſix inches diſtance from each other. By this ligature the pair of cattle are abſolutely hindered from turning different ways, and draw in an even direction with united

force. Thus it appears evidently from reaſon, as well Planterſhip as from experience, that the labour of our beaſts may, by a little contrivance, be rendered more eaſy and effectual.

Of the Culture of various Soils.] In the Britiſh ſugar-colonies there is as great a variety of ſoils as in any country of Europe; ſome naturally very rich or fruitful, yielding a luxuriant product with little labour or culture. This fruitful ſoil is of three kinds: a looſe hazel mould mixed with ſand, like that of St Chriſtopher's, and is the beſt in the known world for producing ſugar in great quantity, and of the beſt quality. The brick mould of Jamaica is ſomewhat of the ſame nature, and next in value; and then the various mixtures of mould and gravel, to be found in veins or plats over all the other iſlands. When any of theſe ſoils are exhausted of their fertility by long and injudicious culture, they may be reſtored by any kind of dung well rotted; for theſe (B) warm ſoils cannot bear hot unrotten dung, without being laid fallow for a conſiderable time after it. Another improvement is by ſea-ſand or ſea-weed; or by digging in the cane-traſh into ſteep lands, and by letting it lie to rot for ſome months. A third method is, by ploughing and laying it fallow; and the fourth method (the beſt of all), is by ſolding the fallows by ſheep. But this can be practiſed only where there are extenſive paſtures; nor can the plough be employed where the ſoil abounds with large ſtones. In that caſe, however, the former method of digging in traſh will be nearly as effectual, tho' more expenſive, by hand-labour, or hoe-ploughing.

The next beſt ſoil for producing good ſugar, is a mould upon clay, which if ſhallow, requires much culture and good labour, or its produce will be ſmall in quantity, though of a ſtrong grain and bright colour, ſo as to yield moſt profit to the refiner of any ſugar, except that produced from an hazel or gravelly ſoil, as before mentioned. All the black-mould ſoils upon marle are generally fruitful, and will take any kind of dung; but yield not ſo ſtrong or large-grained ſugar. Marle, however, of a white, yellow, or blue colour, or rich mould from waſhes, or aſhes of every kind, are excellent for every ſtrong ſoil, as the chief ingredient in the compoſt of dung: either of them will do alone for ſtiff lands; but the yellow and chocolate marle are the moſt ſoapy, and the richeſt kind of manure (except fine mould) for all ſtiff lands. If theſe are well opened, pulverized by culture, and mixed with hot dung, or any kind of looſe earth or marle, they will produce as plentifully as lighter ſoils: and all kinds of clay ſoils, except that of a white colour, have theſe two advantages above the fineſt gravel ſoils, that they do not ſcorch ſoon by dry weather, and never grow weary of the ſame manure, as moſt other ſoils do.

The extraordinary hand-labour beſtowed in making dung, may be ſaved by the art of caving, now in general uſe in England. Ten mules or horſes, and two light tumbrels with broad wheels, and ten able negroes, may, by the common uſe of ſpades, ſhoovels, and light

(A) One pound of native ſulphur, a quart of lamp-oil, and the like quantity of hog's-lard, intimately mixed and made into an ointment, is a cure for the mange, lice, &c.

(B) Theſe ſoils which are naturally looſe and upon marle, Mr Martin calls *hot ſoils*; and theſe, he ſays, have been much injured in ſome of the iſlands by dung haſtily made with marle: but if the ſediment of lees were thrown into theſe pens, after being turned over, it would much improve the dung.

Plantership-light mattocks, or grubbing-hoes, make more dung than 60 able negroes can do in the present methods.

If marle lies upon rising ground, or in hillocks, as it often does, the pit is to be opened at the foot of the declivity; which being dug inwards, till the bank is three feet high, then it is to be *caved* thus. Dig an hollow space of 12 or 18 inches deep under the foot of the bank; then dig into each side of it, another perpendicular cut of the same depth, and 18 inches wide, from the top of the bank to the bottom: that being finished, make a small trench a foot or two from the brink of the bank; pour into it water till full; and when that is done, fill it again, till the water soaking downward makes the marle separate and fall down all at once. This may be repeated till the pit rises to 50 feet high; and then many hundreds of cart-loads of marle may be thrown down by four negroes in two hours; from whence it may be carted into cattle-pens, or laid out upon lands, as occasion requires. Five or six negroes with spades or shovels will keep two or three tumbrils employed, according to the distance of cartage: and thus as much dung may be made by ten negro men, as will dung richly at least 70 or 80 acres of land every year, and laid out also with the assistance of cattle carts: An improvement highly worth every planter's consideration, when negroes, and feeding them are so expensive; and this is no speculation, but has been confirmed by practice. In level lands, the same operation may be as effectual, provided the mouth of the pit be opened by gradual descent to any depth: but when marle is to be found on the side of hills, the operation is less laborious for the horses. But if the surface of the marle-pits (as it often happens) be covered with clay, or stiff soil, so that the water cannot quickly soak from the trench above; in that case, pieces of hard wood, made like piles, four feet long, and four inches square, pointed at one end, and secured at the other square head, by an iron clamp, may be driven by heavy mauls into the trench, as so many wedges, which will make the caved part tumble down: but a skilful eye must watch the last operation, or the labourers may be buried or hurt.

But then clay-foils that are level, and subject to be drowned, or to retain water in stagnated pools, can never be made fruitful by any kind of manure, without being first well drained: for water lying upon any foil will most certainly transform it to a stiff unfruitful clay; as appears evidently by the bogs of Ireland, the fens of Lincoln and Cambridgeshire, and even by the ponds of Barbadoes situated in the deepest and lightest black mould; for that fine foil being washed into those ponds, becomes the stiffest black clay, not fit even for an ingredient in dung, until it has been laid dry, and exposed to the sun for a whole year: but when these bogs and fens are well drained, they become the most fruitful soils. Natural clay the celebrated Boerhaave thinks the fattest of all soils; but then it must be opened by culture, marle, or sandy manures. It is hard to conjecture how the opinion prevailed in the British plantations, that sandy gut-mould was most unfit for clay-foils, as being the means of binding them to the compactness of brick; whereas it is proved, from long experience, to be one of the best means of opening clay-foils, and rendering them abundantly fruitful. Brick is made of *clay alone*; no sand being used in

it, farther than to sprinkle the board on which it is Plantership-moulded into shape. From repeated experience, it appears, that a mixture of sand in gut-mold is the best of all manure for stiff and barren clay-lands; provided they be well drained, by throwing the whole foil into round ridges of 12 feet wide, with furrows of three feet wide between each ridge. And this is done with little more hand-labour than that of hoe-ploughing well in the common way. For if a piece of land be marked in lines at seven feet and a half distance from each other, and the labourers are set in to hoe-plough at the second line, halting back each clod 12 inches; half the ridge, and near half the furrow, is made at the same time: and thus a piece of land may be round-ridged, and the furrows all made at once, by the common operation of hoe-ploughing, provided the digger drives his hoe up to the eye at every stroke. Hoe-ploughing in clay-foils that have lain long under water, is indeed hard labour; but it will every year grow the lighter by being well drained by round-ridging; and in the mean while the labour may be rendered much more easy by the plough conducted by the lines above described. As therefore sandy mould is the best manure for stiff clay; so by parity of reason, confirmed by long experience, stiff clay is the best manure for sandy or chaffy soils.

The method of round-ridging before described, is, by several years experience, found the most essential improvement of flat clayey foils: and yet there are some who will prefer speculation to ocular demonstration, fancying that all kinds of ridges will carry off the mould in heavy rains. The fact is otherwise in clay-foils: and plain reason, without experience, vouches, that where great confluxes of water are divided into many small rills, the force is broken; and therefore less mould carried off the land. Another objection made to round-ridging, is, that by digging much clay to form the sides of the ridge, the foil is impoverished: but this objection stands good only against those ridges which are raised too high, and made too broad; but if land is ridged in the manner before directed, that is, 12 feet broad, and not above six or eight inches higher in the middle than at the sides, the objection vanishes. Ridges were never proposed for light foils or steep lands; and even in flat foils upon loam they should be made with great caution, because *loam melts away by water*. But there are poachy lands of a white clay, even upon small descents, too retentive of water; these may certainly be improved much by ridges of 12 feet wide, as above described, without fear of washes.

But supposing, as the objection urges, that a little clay should be turned up at the sides of such ridges; can it not be manured somewhat more than the other parts, with marle, or sandy mould, so as to become equally good with any other part of the foil? And is not this well worth the labour, since round-ridging not only improves the foil by draining it to a surprising degree, but adds one fifth part to the depth of the staple? And will not a ridge made a little rounding, throw off the water much better than a flat ridge?

The general maxim of not burning cane-trails (which may be called the *stubble of cane-lands*) upon any kind of foil, is surely a great mistake; as may be evinced by observing the contrary practice of the best husbandmen

PlanterShip men in England, where burn-baiting or bastard burn-baiting, is found by experience an admirable method of fertilizing cold, stiff, or clayey lands. It must indeed be a constant practice, not only for the sake of contributing to warm and divide the soil, but as the only effectual means of destroying pernicious insects, and weeds of various kinds, such as French weed, wild pease, and wild vines.

Soon after the difuse of burning trash upon our lands in this island, the blast made its first appearance with incredible devastation: to revive that practice therefore seems to be the most obvious means of expelling it. It may be presumed that the difuse of burning trash was founded upon the mistaken notion of burn-baiting, which is turning up a thick sod of very dry, light, and shallow soils, and burning the whole superficies, or staple, to ashes. This practice the writers upon husbandry condemn universally, and very justly: for though by this practice the land will produce two or three crops more plentifully than ever, yet the soil is blown away by the wind, and the substratum being generally an hungry gravel, or chalk, can never be restored to fertility by the common arts of husbandry. But surely this has no resemblance to our superficial burning of the little trash we can spare from dung: and though this method of burn-baiting light and shallow soils be justly condemned, yet the best writers recommend that very practice, in cold, moist, and heavy soils, as is observed above; and long experience justifies it.

Deep mould upon clay or loam, being subject to the grub-worm (c), will not take any kind of dung, till perfectly rotten, except that of the sheep-fold; which is the best manure for all kinds of light soils, and is of all others the least expensive, as not requiring hand-labour. But the use of the fold is impracticable in any island not abounding with large savannas, or sheep-pastures, as in Jamaica.

Those soils therefore which are subject to the grub, and must be fertilized by common dung, which is a proper nest for the mother-beetle to deposit its eggs, must be well impregnated with the brine of dissolved salt, after the dung is first cut up; two large hog-heads of salt will make brine enough for a dung-pen of 50 feet square.

This cure for the grub is a late discovery; and which has been attended with success, so far as the experiment is made. But though it proves effectual to destroy that pernicious insect in plant-canes, it probably will not be sufficient to save rattoons, without a new application of salt in powder; because the first brine must be washed away, by the time when rattoons spring up.

The planter who would save his rattoons from the grub, ought therefore to cut off the heads of his stools with sharp hoes three inches below the surface of the soil, and then strew a handful of salt round each stool, and cover it up to a level with fine mold taken from the edges.

In soils where there is no grub, and the planter

wishes to have very good rattoons, let him, as soon as his canes are cut, draw all the trash from the stools into the alternate spaces, if planted in that manner; or into the furrows, if his land be round-ridged; and then cut off the head of his stools with sharp hoes, as above directed. Experience has shown the advantage of this practice, and reason demonstrates the great benefit of the rattoon-sprouts rising from three inches below the surface, instead of superficial shoots which came to nothing, and only starve the strong sprouts. Besides, the stubbs which are left upon the stools after the canes are cut, canker, and rot the stools; which is one reason why good rattoons are uncommon in soils long cultivated. Yet it is the opinion of some, that by hoe-ploughing and even dunging rattoons, the produce might be as good as plant-canes, which would save the labour of holing and planting so often as planters commonly do.

Fallowing is of incredible advantage to every soil, not only by being divided into the minutest parts, but also by imbibing those vegetative powers, with which the air is impregnated by the bountiful hand of Providence, whenever rain falls. What those powers are, has been explained under the articles AGRICULTURE and PLANT; and experience evinces, that the tender vegetables of the earth are enervated more by the smallest shower of rain, than by all the water which human art can bestow. Let it therefore be a constant maxim of the planter, never to plant his ground until the soil is well mellowed by fallowing, even though he bestows upon it a due proportion of dung: we lay a due proportion; for too much will force up rank canes, which never yield good sugar; and though some advantage may be reaped from the rattoons, yet it will be found by experience not to compensate the loss by the plants. In stony or steep soils, where the plough cannot be used, or where a sufficient strength of cattle cannot be supported for that purpose, hand-labour or hoe-ploughing must be substituted: but even in that case, much labour may be saved by spreading the dung according to the English husbandry, and digging it into the soil. To evince this truth, let any planter compute his negroes labour of distributing dung by baskets, and by spreading it with dung-forks; and then judge for himself by one single experiment, which is the most profitable.

But if some planters are so devoted to the old custom of distributing dung by baskets, instead of wheelbarrows in level ground, or hand-barrows in uneven land, by which three times the labour may be accomplished in the same time and by the same hands; let them at least save much of their hand-labour, by the following method of laying out dung, before the distribution by baskets.

In holing a piece of land, let a space be left after 80 holes from the first interval, and then the like space after 80 holes throughout the whole plat, which spaces must run exactly parallel to the intervals on the right and left of the holes. Into these spaces the dung may be carted, even before it be rotten (d), at the

moist

(c) This pernicious insect is most apt to engender in dung made from mill-trash, which therefore never ought to be put into dung-compost, or still-ponds; but after being burnt, the ashes will be as good as any other kind. Round-riding, with manure of unwet ashes, sea-sand, or lime, or dry marle, kills the grub.

(d) In order to make dung rot the sooner, much labour is bestowed in digging and turning it over by hoes: but

Planter'ship. most leisure times, and covered with mould, or cane-trash, to prevent exhalation; and in such quantity as will suffice only to dung a row of 40 holes, from the point opposite to each side of it. In the intervals at each side of the cane-piece, which are parallel to those spaces, there must be dung enough carted to manure a row of 40 holes, and covered in like manner.

By thus placing the dung or gut-mould, it is evident at the first sight, that the farthest distance cannot be above 40 holes in distributing the dung: and in case it be not sufficiently rotten for present use, it may be distributed even in dry weather, and covered by the bank; which will both prevent its spirit from exhalation, and occasion it to rot sooner, which is no small advantage. Moreover, by being thus laid out at the most leisure times, and covered with the banks, the dung will be more intimately mixed with the soil, and therefore continue to nourish the plant for a longer time than if laid as usual at the bottom of the holes. A farther advantage of thus distributing the dung, and covering it, results from the more expeditious planting the land, after a short or sudden shower: for the labour of covering the dung, and uncovering it when the land is planted, however it may appear in speculation, is in practice a trifle; and besides all the other advantages arising by the distribution of dung from the spaces above described, this is not the least, that not a bank is trodden under foot. But it is evident, that by distributing the dung with baskets in the present method, the soil is much trampled under foot; and by that means, the very end of hoe-ploughing, or loosening the soil, is much defeated. In like manner, by the present method of hoe-ploughing, the same ill effect is produced; for as the negroes hoe-plough or dig the soil directly forward, so they must necessarily tread the ground as fast as they dig it: whereas, by putting the labourers to dig sidewise, no one puts a foot upon the soil after it is dug; and by lining the land before it is hoe-ploughed, each negro may have an equal share to dig. The only difficulty of hoe-ploughing sidewise is in first setting the negroes to that work; but may be done without loss of time when working in a contiguous field. Whether hoe-ploughing before or after the land be holed for canes, is most eligible, experience must determine; but certainly both operations will be most effectual: and therefore it will be advisable (1), first to plough the soil where the land will admit the plough; and where it will not, to hoe-plough it with, or without dung, as requisite; then let it lie fallow till perfectly mellowed; then hole and plant it; and instead of weeding in the usual manner, let the weeds in all the spaces be dug into the soil: but as this is not to be done so well with the hoe, it is submitted to future experience, whether the dexterous use of spades, as in England, will not answer the purpose much better, and with equal dispatch. But whatever method is preferred, most certain it is, that by loosening the soil in all the spaces

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between the young canes after being come up, their *Planter'ship.* fibres will more easily expand on every side, and acquire more nutrition to enervate their growth. But where the planter grudges this labour, by thinking it needless in a rich loose soil, he may dispatch more weeding-work by the Dutch hoe, than by any other; which being fastened upon the end of a stick, is pushed forward under the roots of the small weeds, in such a manner as to cut them up a little below the surface of the soil, and will do more execution at one shove than can be done at three strokes of the common hoe: but there is yet another practice of the horse-hoe plough, whereby all weeds growing in rows between beans and pease, are extirpated with incredible ease and expedition. It is a very simple machine, drawn by one or two horses, consisting of a pair of low wheels turning upon a common axis; from whence two square irons are let down at equal distances, and triangular hoes made at the ends, the points of the triangles being placed forward, and so fixed as to cut all weeds an inch below the surface, in the same manner as the Dutch garden-hoe abovementioned. By this machine a man and a boy, with two horses or mules, will clear perfectly all the spaces of a field of ten acres in two days, and may be of admirable use in all loose and dry soils in the sugar-islands: for while two horses or mules draw in the space before each other, the wheels pass on the outside of each row of canes, without doing the least injury, while the plough-holder attends to his business. In stiff soils which require draining, neither the horse-hoe plough nor the Dutch hoe can be proper; or any other instrument so effectual as the spade used in the manner above hinted, where the staple is deep.

But where the staple of land is shallow, care must be taken not to dig much below it, according to the universal opinion of all the best writers, supported by the experience of 100 years. Yet some good planters are fallen into the contrary practice, and dig up stiff clay far below the staple. This, Mr Martin says, was done in his own lands, during his absence, by injudiciously ploughing below the staple; and so injured the soil, that all the arts of culture for many years hardly retrieved its former fertility. Indeed where the staple is shallow, upon a fat clay, there turning up a little of it at a time, from the bottom of the cane-holes, and mixing it with rich hot dung, made of marle, or sandy mold, which may take off its cohesive quality, will in due time, and by long fallow, be converted into good soil: but if stiff clay be turned up, without any such mixture, in large quantities, it will infallibly disappoint the operator's hopes: for though solid clay will moulder, by exposure, to a seeming fine earth, yet it will return to its primitive state, very soon after being wet, and covered from the external air, if not divided, as above suggested.

After all, the common horse-hoeing plough drawn by two mules in a line before each other, or the hand-hoe in common use, will answer the purpose

35 A

two-thirds of that labour may be saved by the use of hay-knives, six of which, used dexterously, will cut up a pen in less time than 60 negroes can do by hoes: but hay-knives cannot be used where gritty mould is used in pens.

(2) Deep and loose soils may be ploughed with a small strength of cattle or mules: but stiff lands in hot climates require more strength of cattle than can be maintained in the small pastures of the planters; for if those strong soils are either too wet or too dry (as is generally the case), ploughing is impracticable.

Plantership, very well, where the lands are planted in Mr Tull's method; that is, where the spaces are equal to the land planted, in the following manner.

Suppose six feet planted in two rows of canes, and six feet of land left as a space unplanted; and so a whole piece of land, planted in alternate double rows (r), with equal spaces, may be hoe-ploughed with ease, as before hinted; and that at any time during the growth of canes, when it is most convenient to the planter, which is a considerable advantage; and yet it is the least of all attending this method of culture: for, by leaving these spaces, the canes will have both more air and sun: by hoe-ploughing them, the roots of each double row will have large room for expansion, and consequently, by gaining more nutriment, will grow more luxuriantly: by these spaces the canes may be cleaned from the blast with much more ease and convenience; and will serve as proper beds to plant great corn, without the least injury to the canes; as well as to contain the trash taken off the land, where, by rotting, and being hoe-ploughed into the soil, it will be wonderfully enriched, and well fitted to be planted immediately after the canes in the neighbouring double rows are cut down. Besides all these admirable advantages of planting the land in alternate double rows with equal spaces, the canes, when at full age, may be easily stripped of their trash, and by that means the juice rendered so mature as to yield double the produce, and much better sugars than unstripped canes. This method of culture may be recommended for all kinds of soil: for as by this practice the rank luxuriant canes will be more matured, so the poor soils will be rendered more fruitful; and as the roots of the canes which expand into these spaces, will be kept moist by being covered with rotten trash, so they must bear dry weather much longer in the burning soils. In those low lands which require draining by furrows, the alternate double rows and spaces must be made cross the ridges; by which means, those spaces, being hoe-ploughed from the centre to the sides, will be always preserved in a proper state of roundness. By this method of planting, the canes may be so well ripened as to yield double the quantity of sugar, of canes planted in the close manner; which saves half the labour of cartage, half the time of grinding and boiling, and half the fuel, besides yielding finer sugar.

Yet, how well soever the method of planting in single or double alternate rows has succeeded in the loose and stiff soils, experience has shown that it is a wrong practice in stiff lands that are thrown into round or flat ridges: for these being most apt to crack, the sun-beams penetrate soon to the cane-roots, stop their growth, and have an ill influence upon the sugar. It is therefore advisable to plant such lands full, but in large holes, of 4 feet, by 5 feet towards the banks: after the plant-canes are cut, to dig out one, and leave two

rows standing, hoe-ploughing the spaces after turning Plantership: all the trash into furrows till almost rotten: for if the trash is drawn upon the hoe-ploughed spaces, they will hardly ever moulder; at least not till the trash is quite rotten. This is an infallible proof from experience, of how little advantage trash is to the soil, unless it be in great droughts, to keep out the intense sun-beams: for, in all other respects, it prevents that joint operation of the sun and air in mouldering and fructifying the soil, as has been proved by repeated experiments.

But in flat stiff soils that are properly drained by round-ridging, no culture prevents cracking so effectually as hoe-ploughing into them a quantity of loose marl, of which that of a chocolate or of a yellow colour is best; and will be still much better, by lying upon the land, in small heaps, or in cane-holes, for some time, to imbibe the vegetative powers of the air, before it is intimately mixed with the soil.

As to the manner of planting canes, the general practice of allowing four feet by five to an hole, and two fresh (g) plants, is found by common experience to be right and good in alternate rows. But the following precautions are necessary to be observed. First, let all the cane-rows run east and west, that the trade-wind may pass freely through them; because air and sunshine are as conducive to the growth and maturation of sugar-canes, as any other vegetable. Secondly, let not any accession of mould be drawn into hills round the young canes, except where water stagnates (h); because the fibres which run horizontally, and near the surface, are much broken and spoiled by that practice. Thirdly, let the sugar-canes be cut at their full maturity; which, in a dry loose soils, is generally at the end of 14 or 15 months after being planted; but in cold clay-soils, not till 16 or 17 months. Fourthly, as the cane-rows run east and west in as proper a direction as possible for cartage to the sugar-work, so canes must be cut the contrary way if the planter expects any great produce from his ratoon: for by beginning to cut canes at the part of his field most remote from the works, the carts cannot often pass over the same track, and consequently the cane-stools cannot be injured, more especially if he takes due care to cut the canes very close to their roots; for, by leaving a long stub, (which must perish) the cane-stools are much injured. It may be objected to the practice of the cuttings cane transversely to the rows, that the negroes labour will not be so equally divided: but let every man consider both sides of the question, and be determined by his own experience; and then he will be convinced, that it matters very little which way he cuts straight standing canes; but in cases where the sugar-canes lean, or are lodged by preceding high winds, it is a point of great importance to place the labourers so as to cut the canes first at the roots, and then, drawing them, cut off the tops: for thus by two strokes each cane will be

(r) In stiff lands, the single alternate rows of four feet distance, as preventive of much labour in weeding, are found best; and also yield more sugar by the acre; and are less apt to be affected by drought.

(g) It is an odd fancy that stale plants grew best, when both reason and experience show that the most succulent plants are best: one good plant in the centre of a large hole is sufficient when the land is full holed.

(h) The stagnation of water in pools (usual in stiff level lands) is the most injurious circumstance attending it; for that, by long duration, will convert the finest mould to stiff clay. The proprietor of such a soil must therefore grudge no labour to drain it well; and yet by such easy gradation, as to prevent the mould from being washed away by great floods, in case the under stratum is a loam.

PlanterShip be cut; and twice the quantity cut in the same time, and by the same hands, more than by cutting in any other direction. In round-ridged land, it is proper to cut canes in the same direction of the ridges, throwing the tops and trash into the furrows to render the cartage easy, and to preserve the ridges in their proper form.

It is almost needless to suggest the expediency of planting the cane-pieces of a plantation in exact squares, so that the intervals may intersect at right angles; since such regularity is not only more beautiful, more safe in case of accidental fires, and a better disposition of the whole for dividing and planting one third or fourth part of a plantation every year, but also much easier guarded by a few watchmen: for one of these walking in a line from east to west, and the other from north to south, look through every avenue, where the most subtle thief cannot escape the watchful eye. And if the intervals surrounding the boundary of a regular plantation be made 24 feet wide, the proprietor will receive ample recompense for so much land, by the security of his canes from fires kindled in the neighbourhood, and by planting all that land in plantain-trees, which may at once yield food and shade to the watchmen, who by that means can have no excuse for absence from their proper stations. But as fuel grows very scarce in most of our islands, it is also expedient to plant a logwood or flower-fence in all the boundaries of every plantation, which, being cut every year, will furnish good store of faggots. Logwood makes the strongest and quickest of all fences, and agrees with every soil: the cuttings make excellent oven-fuel.

So much for the general operations of plantership, according to the approved directions of Mr Martin. For the particular cultivation of the sugar-canes, the extraction of the sugar, and the distillation of rum, see the articles SACCHARUM, SUGAR, and RUM.

PLANTIN (Christopher), a celebrated printer, was born near Tours in 1533, and bred to an art which he carried to the highest degree of perfection. He went and settled at Antwerp; and there erected a printing-office, which was considered not only as the chief ornament of the town, but as one of the most extraordinary edifices in Europe. A great number of ancient authors were printed here; and these editions were valued not only for the beauty of the characters, but also for the correctness of the text, with regard to which Plantin was so very nice, that he procured the most learned men to be correctors of his press. He got immense riches by his profession; which however he did not hoard up, but spent like a gentleman. He died in 1598, aged 65 years; and left a most sumptuous and valuable library to his grandson Balthazar.

PLANTING, in agriculture and gardening, is setting a tree or plant, taken from its proper place, in a new hole or pit; throwing fresh earth over its root, and filling up the hole to the level of the surface of the ground.

The first thing in planting is to prepare the ground before the trees or plants are taken out of the earth, that they may remain out of the ground as short a time as possible; and the next is, to take up the trees or plants, in order to their being transplanted. In taking up the trees, carefully dig away the earth round

the roots, so as to come at their several parts to cut them off; for if they are torn out of the ground without care, the roots will be broken and bruised, to the great injury of the trees. When you have taken them up, the next thing is to prepare them for planting by pruning the roots and heads. And first, as to the roots; all the small fibres are to be cut off, as near to the place from whence they are produced as may be, except they are to be replanted immediately after they are taken up. Then prune off all the bruised or broken roots, all such as are irregular and cross each other, and all downright roots, especially in fruit-trees: shorten the larger roots in proportion to the age, the strength, and nature of the tree; observing that the walnut, mulberry, and some other tender-rooted kinds, should not be pruned so close as the more hardy sorts of fruit and forest trees: in young fruit-trees, such as pears, apples, plumbs, peaches, &c. that are one year old from the time of their budding or grafting, the roots may be left only about eight or nine inches long; but in older trees, they must be left of a much greater length: but this is only to be understood of the larger roots; for the small ones must be chiefly cut quite out, or pruned very short. The next thing is the pruning of their heads, which must be differently performed in different trees; and the design of the trees must also be considered. Thus, if they are designed for walls or espaliers, it is best to plant them with the greatest part of their heads, which should remain on till they begin to shoot in the spring, when they must be cut down to five or six eyes, at the same time taking care not to disturb the roots. But if the trees are designed for standards, you should prune off all the small branches close to the place where they are produced, as also the irregular ones which cross each other; and after having displaced these branches, you should also cut off all such parts of branches as have by any accident been broken or wounded; but by no means cut off the main leading shoots which are necessary to attract the sap from the root, and thereby promote the growth of the tree. Having thus prepared the trees for planting, you must now proceed to place them in the earth: but first, if the trees have been long out of the ground, so that the fibres of the roots are dried, place them eight or ten hours in water, before they are planted, with their heads erect, and the roots only immersed therein; which will swell the dried vessels of the roots, and prepare them to imbibite nourishment from the earth. In planting them, great regard should be had to the nature of the soil: for if that be cold and moist, the trees should be planted very shallow; and if it be a hard rock or gravel, it will be better to raise a hill of earth where each tree is to be planted, than to dig into the rock or gravel, and fill it up with earth, as is too often practised, by which means the trees are planted as it were in a tub, and have but little room to extend their roots. The next thing to be observed is, to place the trees in the hole in such a manner that the roots may be about the same depth in the ground as before they were taken up; then break the earth fine with a spade, and scatter it into the hole, so that it may fall in between every root, that there may be no hollow-ness in the earth: then having filled up the hole, gently tread down the earth with your feet, but do

Plantin

Planting
Plashing.

not make it too hard; which is a great fault, especially if the ground be strong or wet. Having thus planted the trees, they should be fastened to stakes driven into the ground to prevent their being displaced by the wind, and some mulch laid upon the surface of the ground about their roots; as to such as are planted against walls, their roots should be placed about five or six inches from the wall, to which their heads should be nailed to prevent their being blown up by the wind. The seasons for planting are various, according to the different sorts of trees, or the soil in which they are planted. For the trees whose leaves fall off in winter, the best time is the beginning of October, provided the soil be dry; but if it be a very wet soil, it is better to defer it till the latter end of February, or the beginning of March: and for many kinds of evergreens, the beginning of April is by far the best season; though they may be safely removed at Midsummer, provided they are not to be carried very far, should always make choice of a cloudy wet season.

Reverse PLANTING, a method of planting in which the natural position of the plant or shoot is inverted; the branches being set into the earth, and the root reared into the air. Dr Agricola mentions this monstrous method of planting, which he found to succeed very well in moist or all sorts of fruit-trees, timber-trees, &c. Bradley affirms that he has seen a lime-tree in Holland growing with its first roots in the air, which had shot out branches in great plenty, at the same time that its first branches produced roots and fed the tree. Mr Fairchild, of Hoxton, has practised the same with us, and gives the following directions for performing it: Make choice of a young tree of one shoot, of alder, elm, willow, or any other tree that easily takes root by laying; bend the shoot gently down into the earth, and so let it remain till it has taken root. Then dig about the first root, and raise it gently out of the ground, till the stem be nearly upright, and stake it up. Then prune the roots, now erected in the air, from the bruises and wounds they received in being dug up; and anoint the pruned parts with a composition of two ounces of turpentine, four ounces of tallow, and four ounces of bees wax, melted together, and applied pretty warm. Afterwards prune off all the buds or shoots that are upon the stem, and dress the wounds with the same composition, to prevent any collateral shootings, that might spoil the beauty of the stem.

PLANUDES (Maximus), a Greek monk of Constantinople, towards the end of the 14th century, who published a collection of epigrams intitled *Anthologia*; a Greek translation of Ovid's *Metamorphoses*; a *Life of Ætop*, which is rather a romance than a history; and some other works. We know nothing more of him, than that he suffered some persecution on account of his attachment to the Latin church.

PLASHING of QUICKSET-HEDGES, an operation very necessary to promote the growth and continuance of old hedges. See the article *HEDGE*.

It is performed in this manner: The old stubs must be cut off, &c. within two or three inches of the ground; and the best and longest of the middle-sized shoots must be left to lay down. Some of the strong-

est of these must also be left to answer the purpose of stakes. These are to be cut off to the height at which the hedge is intended to be left; and they are to stand at ten feet distance one from another: when there are not proper shoots for these at the due distances, their places must be supplied with common stakes of dead wood. The hedge is to be first thinned, by cutting away all but those shoots which are intended to be used either as stakes, or the other work of the plashing: the ditch is to be cleaned out with the spade; and it must be now dug as at first, with sloping sides each way; and when there is any cavity on the bank on which the hedge grows, or the earth has been washed away from the roots of the shrubs, it is to be made good by facing it, as they express it, with the mould dug from the upper part of the ditch: all the rest of the earth dug out of the ditch is to be laid upon the top of the bank: and the owner should look carefully into it that this be done; for the workmen, to spare themselves trouble, are apt to throw as much as they can upon the face of the bank; which being by this means overloaded, is soon washed off into the ditch again, and a very great part of the work undone; whereas what is laid on the top of the bank always remains there, and makes a good fence of an indifferent hedge.

In the plashing the quick, two extremes are to be avoided; these are, the laying it too low, and the laying it too thick. The latter makes the sap run all into the shoots, and leaves the plashes without sufficient nourishment; which, with the thickness of the hedge, finally kills them. The other extreme of laying them too high, is equally to be avoided; for this carries up all the nourishment into the plashes, and so makes the shoots small and weak at the bottom, and consequently the hedge thin. This is a common error in the north of England. The best hedges made any where in England, are those in Hertfordshire; for they are plashed in a middle way between the two extremes, and the cattle are by that prevented both from cropping the young shoots, and from going through; and a new and vigorous hedge soon forms itself.

When the shoot is bent down that is intended to be plashed, it must be cut half way through with the bill: the cut must be given sloping, somewhat downwards, and then it is to be wound about the stakes, and after this its superfluous branches are to be cut off as they stand out at the sides of the hedge. If for the first year or two, the field where a new hedge is made can be ploughed, it will thrive the better for it; but if the stubs are very old, it is best to cut them quite down, and to secure them with good dead hedges on both sides, till the shoots are grown up from them strong enough to plash; and wherever void spaces are seen, new sets are to be planted to fill them up. A new hedge raised from sets in the common way, generally requires plashing in about eight or nine years after.

PLASTER, in pharmacy, an external application of a harder consistence than an ointment; to be spread, according to the different circumstances of the wound, place, or patient, either upon linen or leather. See *PHARMACY*, n° 854, &c.

PLASTER, or PLASTER, in building, a composition

Plashing,
Plaster.

Plaster. tion of lime, sometimes with sand, &c. to parget, or cover the nudities of a building. See PARGETTING and STUCCO.

PLASTER of Paris, a preparation of several species of gypsum dug near Mont Maitre, a village in the neighbourhood of Paris; whence the name. See GYPSUM; and CHEMISTRY, n° 127, 128.

The best sort is hard, white, shining, and marbly; known by the name of *plaster-stone* or *parget of Mount Maitre*. It will neither give fire with steel, nor ferment with aqua fortis; but very freely and readily calcines in the fire into a fine plaster, the use of which in building and casting statues is well known.

The method of representing a face truly in plaster of Paris is this: The person whose figure is designed is laid on his back, with any convenient thing to keep off the hair. Into each nostril is conveyed a conical piece of stiff paper, open at both ends, to allow of respiration. These tubes being anointed with oil, are supported by the hand of an assistant; then the face is lightly oiled over, and the eyes being kept shut, alabaster fresh calcined, and tempered to a thinish consistence with water, is by spoonfuls nimble thrown all over the face, till it lies near the thickness of an inch. This matter grows sensibly hot, and in about a quarter of an hour hardening into a kind of stony concretion; which being gently taken off, represents, on its concave surface, the minutest part of the original face. In this a head of good clay may be moulded, and therein the eyes are to be opened, and other necessary amendments made. This second face being anointed with oil, a second mould of calcined alabaster is made, consisting of two parts joined lengthwise along the ridge of the nose; and herein may be cast, with the same matter, a face extremely like the original.

If finely powdered alabaster, or plaster of Paris, be put into a basin over a fire, it will, when hot, assume the appearance of a fluid, by rolling in waves, yielding to the touch, steaming, &c. all which properties it again loses on the departure of the heat; and being thrown upon paper, will not at all wet it, but immediately discover itself to be as motionless as before it was set over the fire; whereby it appears, that a heap of such little bodies, as are neither spherical nor otherwise regularly shaped, nor small enough to be below the discernment of the eye, may, without fusion, be made fluid, barely by a sufficiently strong and various agitation of the particles which compose it; and moreover lose its fluidity immediately upon the cessation thereof.

Two or three spoonfuls of burnt alabaster, mixed up thin with water, in a short time coagulate, at the bottom of a vessel full of water, into a hard lump, notwithstanding the water that surrounded it. Artificers observe, that the coagulating property of burnt alabaster will be very much impaired or lost, if the powder be kept too long, especially if in the open air, before it is made use of; and when it hath been once tempered with water, and suffered to grow hard, they cannot, by any burning or powdering of it again, make it serviceable for their purpose as before.

This matter, when wrought into vessels, &c. is still of so loose and spongy a texture, that the air has easy passage through it. Mr Boyle gives an account,

among his experiments with the air-pump, of his preparing a tube of this plaster, closed at one end and open at the other; and on applying the open end to the cement, as is usually done with the receivers, it was found utterly impossible to exhaust all the air out of it; for fresh air from without pressed in as fast as the other, or internal air, was exhausted, though the sides of the tube were of a considerable thickness. A tube of iron was then put on the engine; so that being filled with water, the tube of plaster of Paris was covered with it; and on using the pump, it was immediately seen, that the water passed through into it as easily as the air had done, when that was the ambient fluid. After this, trying it with Venice turpentine instead of water, the thing succeeded very well; and the tube might be perfectly exhausted, and would remain in that state several hours. After this, on pouring some hot oil upon the turpentine, the case was much altered; for the turpentine melting with this, that became a thinner fluid, and in this state capable of passing like water into the pores of the plaster. On taking away the tube after this, it was remarkable that the turpentine, which had pervaded and filled its pores, rendered it transparent, in the manner that water gives transparency to that singular stone called *oculus mundi*. In this manner, the weight of air, under proper management, will be capable of making several sorts of glues penetrate plaster of Paris; and not only this, but baked earth, wood, and all other bodies, porous enough to admit water on this occasion.

PLASTERING. See PARGETTING.

PLASTIC, denotes a thing endowed with a formative power, or a faculty of forming or fashioning a mass of matter after the likeness of a living being; such a virtue, as some of the ancient Epicureans, and perhaps the Peripatetics too, imagined to reside in the earth, or at least to have anciently resided therein, by means whereof, and without any extraordinary intervention of a Creator, it put forth plants, &c. Some of them seem to have been of opinion that animals, and even man himself, were the effects of this plastic power.

PLASTIC Art, the art of representing all sorts of figures by the means of moulds. This term is derived from the Greek word *πλαστικη*, which signifies the "art of forming, modelling, or casting in a mould." A mould, in general, is a body that is made hollow for that purpose. The artist makes use of them to form figures in bronze, lead, gold, silver, or any other metal, or fusible substance. The mould is made of clay, stucco, or other composition, and is hollowed into the form of the figure that is to be produced; they then apply the jet, which is a sort of funnel, through which the metal is poured that is to form the figures, and that is called *running the metal into the mould*.

It is in this manner, but with much practice and attention, that the artist forms, 1. Equestrian and pedestrian statues of every kind; 2. Groups; 3. Pedestals; 4. Bas-reliefs; 5. Medallions; 6. Cannons, mortars, and other pieces of artillery; 7. Ornaments of architecture, as capitals, bases, &c.; 8. Various sorts of furniture, as lustres, branches, &c. in every kind of metal: and in the same manner figures are cast in stucco, plaster, or any other fusible matter.

Wax

Wax being a substance that is very easily put in fusion, plastics makes much use of it. There are impressions which are highly pleasing in coloured wax, of medallions, basso and alto relievos, and of detached figures; which however are somewhat brittle. But this matter has been carried too far: they have not only formed moulds to represent the likenesses and the bust of a living person, by applying the plaster to the face itself, and afterward casting melted wax into the mould; but they have also painted that waxen bust with the natural colours of the face, and have then applied glass eyes and natural hair; to which they have joined a stuffed body and limbs, with hands of wax; and have, lastly, dressed their figure in a real habit; and by these means have produced an object the most shocking and detestable that it is possible to conceive. It is not a statue, a bust, a natural resemblance that they form; but a dead body, a lifeless countenance, a mere carcase. The stiff air, the inflexible muscles, the haggard eyes of glass, all contribute to produce an object that is hideous and disgusting to every man of taste. Figures like these offend by affording too exact an imitation of nature. In no one of the polite arts ought imitation ever to approach so near the truth as to be taken for nature herself. Illusion must have its bounds; without which it becomes ridiculous.

There is another invention, far more ingenious and pleasing, which is that wherein M. Lippart, antiquary and artist at Dresden, now excels. He has found the means of resembling, by indefatigable labour, great expence, and infinite taste, that immense number of stones, engraved and in cameau, which are to be seen in the most celebrated cabinets. He has made choice of those that are the most beautiful; and, with a paste of his own invention, he takes from these stones an impression that is surprisingly accurate, and which afterward become as hard as marble: these impressions he calls *pasti*. He then gives them a proper colour, and incloses each with a gold rim; and, by ranging them in a judicious order, forms of them an admirable system. They are fixed on pasteboards, which form so many drawers, and are then inclosed in cases, which represent folio volumes, and have titles wrote on their backs; so that these fictitious books may conveniently occupy a place in a library. Nothing can be more ingenious than this invention; and, by this method, persons of moderate fortune are enabled to make a complete collection of all antiquity has left that is excellent of this kind; and these copies are very little inferior to the originals.

There is also another method of taking the impressions of cameaus, medals, and coins, which is as follows: They wash or properly clean the piece whose impression is to be taken, and surround it with a border of wax. They then dissolve isinglass in water, and make a decoction of it, mixing with it some vermilion to give it an agreeable red colour. They pour this paste, when hot, on the stone or medal, to the thickness of about the tenth part of an inch; they then leave it exposed to the sun, in a place free from dust. After a few days this paste becomes hard, and offers to the eye the most admirable and faithful representation of the medal that it is possible to conceive: they are then carefully placed in drawers; and thousands of

these impressions, which comprehend many ages, may be included in a small compass.

The proficient in plastics have likewise invented the art of casting, in a mould, papier maché or dissolved paper, and forming it into figures in imitation of sculpture, of ornaments and decorations for ceilings, furniture, &c. and which they afterwards paint or gild. There are, however, some inconveniencies attending this art; as, for example, the imperfections in the moulds, which render the contours of the figures inelegant, and give them a heavy air: these ornaments, moreover, are not so durable as those of bronze or wood, seeing that in a few years they are preyed on by the worm.

The figures that are given to porcelain, delphit ware, &c. belong also to plastics; for they are formed by moulds, as well as by the art of the sculptor and turner; and by all these arts united, are made vases of every kind, figures, groups, and other designs, either for use or ornament.

From this general article the reader is referred to *FOUNDERY, CASTING, GLASS, CHINA Ware, PAPIER-Mache, POTTERY.*

PLATA, the name of a very great river of South America, running through the province of Paraguay; whence the whole country is sometimes called *Plata*; though this name is usually bestowed only upon a part of Paraguay. In the latter sense it comprehends all that country bounded on the east and south-east by the Atlantic Ocean; on the south, by Terra Magellanica; on the west, by Tucuman; and on the north, by the provinces of Paraguay Proper, and Parana. The great river La Plata, from which the country has its name, was first discovered, in 1515, by Juan Diaz de Solis; but denominated *La Plata* by Sebastian Gabato, from the great quantity of the precious metals he procured from the adjacent inhabitants, imagining it was the produce of the country, though in fact they brought it from Peru.

The country lies between 32° and 37° of south latitude. The climate is pleasant and healthy. Their winter is in May, June, and July, when the nights are indeed very cold, but the days moderately warm; the frost is neither violent nor lasting, and the snows are very inconsiderable.

The country consists mostly of plains of a vast extent, and exceeding rich soil, producing all sorts of European and American fruits, wheat, maize, cotton, sugar, honey, &c. and abounding with such excellent pastures, that the beasts brought hither from Spain are multiplied to such a degree, that they are all in common, no man claiming any property in them, but every man takes what he hath occasion for. The number of black cattle, especially, is so prodigious, that many thousands of them are killed merely for their hides, every time the ships go for Spain, and their carcases left to be devoured by wild beasts and birds of prey, which are also very numerous. Sometimes, when they cannot vend their hides, they will kill them for their tongues; and those who care not to be at the trouble to fetch them from the plains, may buy them for a trifle. There is a curious account in Lord Anson's voyage of the manner of hunting them on horseback; and of catching and killing them, by throwing a noose on their horns at full gallop, the horses being trained

to the sport. Horses are no less numerous, and in common, like the other cattle; so that a man may have as many as he pleases for the catching; and of those that are already broke, one may buy some of the best, and of the true Spanish breed, for a piece of eight per head. Wild-fowl also is in great plenty here; partridges, in particular, are more numerous, and as large and tame as our hens, so that one may kill them with a stick. Their wheat makes the finest and whitest of bread; and, in a word, they seem to want for nothing here, especially the natives, but salt and fuel. The former the Spaniards have brought to them from other parts; and the latter they supply themselves with, by planting vast numbers of almond, peach, and other trees, which require no other trouble than putting the kernels into the ground, and by the next year, we are told, they begin to bear fruit. The return for European commodities is so great here, that it almost exceeds belief; an ordinary two-penny knife fetching a crown; and a gun of the value of 10 or 12 shillings, 20 or 30 crowns, and so of the rest.

The river Plata rises in Peru, and receives a great many others in its course, the chief of which is the Paraguay. The water of it is said to be very clear and sweet, and to petrify wood; and contains such plenty and variety of fish, that the people catch great quantities of them without any other instrument than their hands. It runs mostly to the south and south-east; and is navigable the greater part of its course by the largest vessels, and full of delightful islands. All along its banks are seen the most beautiful birds of all kinds; but it sometimes overflows the adjacent country to a great extent, and is infested by serpents of a prodigious bigness. From its junction with the Paraguay to its mouth is above 200 leagues. We may form some judgment of its largeness by the width of its mouth, which is said to be about 70 leagues. Before it falls into the Paraguay, it is called *Panama*.

PLATEÆ, (anc. geog.), a very strong town of Bœotia, in its situation exposed to the north wind, (Theophrastus); burnt to the ground by Xerxes, (Herodotus, Justinus); mentioned much in the course of the Persian war: Famous for the defeat of Mardonius, the Persian general; and for the most signal victory of the Lacedæmonians and other Greeks under Pausanias the Lacedæmonian, and Aricides an Athenian general, (Nepos, Diodorus, Plutarch); in memory of which the Greeks erected a temple to Jupiter Eleutherius, and instituted games which they called *Eleutheria*; and there they show the tombs of those who fell in that battle, (Strabo). It stood at the foot of mount Cithæron, between that and Thebes to the north, on the road to Athens and Megara, and on the confines of Attica and Megaris. Now in ruins.

PLATALEA, the **SPONBILL**, in ornithology, a genus belonging to the order of gallinæ. The beak is plain, and dilates towards the point into an orbicular form; the feet have three toes, and are half palmated. There are three species, distinguished by their colour. They inhabit the continent of Europe. See Plate CCXLIV. fig. 3.

PLATANUS, the **PLANE-TREE**; a genus of the polyandria order, belonging to the monœcia class of plants.

Species. 1. The *orientalis*, oriental or eastern plane-tree, rises with a very straight smooth branching item, to a great height. It has palmated leaves, six or eight inches long and as much broad, divided into five large segments, having the side ones cut into two smaller, green above, and pale underneath; and long pendulous pedunculi, each sustaining several round heads of close-fitting very small flowers; succeeded by numerous downy seeds, collected into round, rough, hard balls. It is a native of Asia and many parts of the east, and grows in great plenty in the Levant. 2. The *occidentalis*, occidental, or western plane-tree, rises with a straight smooth stem, to a great height, branching widely around; it has lobated leaves, seven or eight inches long, and from nine or ten to twelve or fourteen broad, divided into three large lobes; and very small flowers, collected into round heads, succeeded by round, rough, balls of seed. It is a native of Virginia, and other parts of North America; where it attains an enormous size, and is remarkable for having its stem all of an equal girth for a considerable length: we have an account of some trees being eight or nine yards in circumference, and which when felled afforded 20 loads of wood. The varieties of these two species, are the Spanish or middle plane-tree, having remarkably large leaves of three or five narrower segments; and the maple-leaved plane-tree, having smallest leaves, somewhat lobated into five segments, resembling the maple-tree leaf.

All these elegant trees are of hardy temperature, so as to prosper here in any common soil, and exposure in our open plantations, &c. and are some of the most desirable trees of the deciduous tribe. They were in singular esteem among the ancients of the east, for their extraordinary beauty, and the delightful shade they afforded by their noble foliage. The leaves commonly expand in May, and fall off early in autumn; and the flowers appear in spring, a little before the leaves, being succeeded by seeds, which in fine seasons frequently ripen here in September. These fine trees have singular merit for all ornamental plantations. Their straight growth, regular branching heads, and the lofty stature they attain, together with the extraordinary breadth of their luxuriant leaves, render them extremely desirable furniture to adorn avenues, lawns, parks, and woods; some disposed in ranges, some as single standards, others in clumps, some in groves, &c. They are most excellent for shade; for it is observable, that no tree is better calculated to defend us from the heat in summer, by its noble spreading foliage, and to admit the sun's rays more freely in winter, on account of the distance of its branches, which is always in proportion to the size of the leaves. They may also be employed in the collection of the forest-trees, in woods, to grow up to timber, in which they will also prove advantageous in time. In short, these noble trees claim the esteem of every one concerned in plantations of every kind; but more particularly in extensive works, where they may be so variously disposed as to have a charming effect.

The propagation of these trees is by seed, layers, and cuttings. The seeds frequently ripen in these parts, and are also procured from other countries, and may be obtained of the nurserymen or seedmen. The best season for sowing them is autumn, if they

Platanus
Plate.

Plate,
Platform.

can be then possibly procured. Choose a somewhat shady moist soil : and having dug the ground, and raked it fine, form it into four-foot wide beds, and either scatter the seeds evenly on the surface and rake them in, or previously with the back of a rake turn the earth off the surface near half an inch deep into the alleys ; then sow the seed, and directly, with the rake turned the proper way, draw the earth evenly over the seeds, and trim the surface smooth : many of the plants will rise in spring, and probably may not till the spring following. When they are one or two years old, plant them out in nursery rows, two or three feet asunder, and about half that distance in the lines; here to remain till of a proper size for final transplantation. The method of propagation by layers is very commonly practised in the nurseries, in default of seed, and by which they must readily grow; for which purpose, some stout plants for stools must be planted, which in a year after must be headed down near the bottom, that they may throw out many shoots near the ground, convenient for laying ; which, in the autumn after they are produced, lay by for slit-laying ; and by autumn after, they will be well rooted, and form plants two or three feet high, so may be separated, and planted in nursery-rows, like the seedlings. —All the sorts will take tolerably by cutting off the strong young shoots; but the *platanus occidentalis* more freely than the oriental kind. Autumn is the best season: as soon as the leaf falls, choose strong young shoots, and plant them in a moist soil ; many of them will grow, and make tolerable plants by next autumn. It should be remarked, that in order to continue the distinction of the varieties more effectually, they should be propagated either by layers or cuttings: for when raised from seed, those of the respective species generally vary.

PLATBAND, in gardening, a border or bed of flowers, along a wall, or the side of a parterre, frequently edged with box, &c.

PLATBAND of a door or window, is used for the lintel, where that is made square, or not much marked.

PLATE, a term used by our sportsmen to express the reward given to the best horse at our races.

The winning a plate is not the work of a few days to the owner of the horse ; but great care and preparation is to be made for it, if there is any great dependence on the success. A month is the least time that can be allowed to draw the horse's body clear, and to refine his wind to that degree of perfection that is attainable by art.

It is first necessary to take an exact view of his body, whether he be low or high in flesh ; and it is also necessary to consider whether he be dull and heavy, or brisk and lively, when abroad. If he appear dull and heavy, and there is reason to suppose it is owing to too hard riding, or, as the jockeys express it, to some grease that has been dissolved in hunting, and has not been removed by scouring, then the proper remedy is half an ounce of diapente given in a pint of good sack ; this will at once remove the cause, and revive the creature's spirits. After this, for the first week of the month, he is to be fed with oats, broad, and split beans ; giving him sometimes the one and sometimes the other, as he likes best ; and always leaving some

in the locker, that he may feed at leisure when he is left alone. When the groom returns at the feeding-time, whatever is left of this must be removed, and fresh given ; by this means the creature will soon become high spirited, wanton, and full of play. Every day he must be rode out an airing, and every other day it will be proper to give him a little more exercise ; but not so much as to make him sweat too much. The beans and oats in this case are to be put into a bag, and beaten till the hulls are all off, and then winnowed clean ; and the bread, instead of being chipped in the common way, is to have the crust clean cut off. If the horse be in good flesh and spirits when taken up for its month's preparation, the diapente must be omitted ; and the chief business will be to give him good food, and so much exercise as will keep him in wind, without over-sweating him or tiring his spirits. When he takes larger exercises afterwards, towards the end of the month, it will be proper to have some horses in the place to run against him. This will put him upon his mettle, and the beating them will give him spirits. This, however, is to be cautiously observed, that he has not a bloody heat given him for ten days or a fortnight before the plate is to be run for ; and that the last heat that is given him the day before the race, must be in his clothes: this will make him run with greatly more vigour, when stripped for the race, and feeling the cold wind on every part.

In the second week, the horse should have the same food, and more exercise. In the last fortnight, he must have dried oats, that have been hulled by beating. After this they are to be wetted in a quantity of whites of eggs beaten up, and then laid out in the sun to dry ; and when as dry as before, the horse is to have them. This sort of food is very light of digestion, and very good for the creature's wind. The beans in this time should be given more sparingly, and the bread should be made of three parts wheat and one part beans. If he should become colicive under this course, he must then have some ale and whites of eggs beaten together: this will cool him, and keep his body moist.

In the last week the malt is to be omitted, and barley-water given him in its place, every day, till the day before the race: he should have his fill of hay ; then he must have it given him more sparingly, that he may have time to digest it ; and in the morning of the race day, he must have a toast or two of white bread soaked in sack, and the same just before he is led out to the field. This is an excellent method, because the two extremes of fullness and fasting are at this time to be equally avoided ; the one hurting his wind, and the other occasioning faintness that may make him lose. After he has had his food, the litter is to be shook up, and the stable kept quiet, that he may be disturbed by nothing till he is taken out to run.

PLATFORM, in the military art, an elevation of earth, on which cannon is placed, to fire on the enemy ; such are the mounts in the middle of curtains. On the ramparts there is always a platform, where the cannon are mounted. It is made by the heaping up of earth on the rampart, or by an arrangement of madders, rising insensibly, for the cannon to roll on, either in a casemate, or on attack in the outworks. All

Platform,
Platina.

Platina.

practitioners are agreed, that no shot can be depended on; unless the piece can be placed on a solid platform; for if the platform shakes with the first impulse of the powder, the piece must likewise shake, which will alter its directions and render the shot uncertain.

PLATFORM, in architecture, is a row of beams, which support the timber-work of a roof, and lie on the top of a wall, where the entablature ought to be raised.

This term is also used for a kind of terrace, or broad smooth open walk at the top of a building, from whence a fair prospect may be taken of the adjacent country. Hence an edifice is said to be covered with a platform, when it is flat at top, and has no ridge. Most of the Oriental buildings are thus covered, as were all those of the ancients.

PLATFORM, or *Orlop*, in a man of war, a place on the lower deck, abast the main mast, between it and the cockpit; and round about the main capstan, where provision is made for the wounded men in time of action.

PLATINA, a metallic substance, analogous to the perfect metals, especially to gold, as many properties are common to both.

Although metals, from their great utility, have been always diligently searched for, yet this has remained undiscovered till lately; which is a very surprising circumstance, and which seems to prove, that platina is not, like the other metals, scattered in different parts of the world, and in all climates. Platina is found in the golden mines of Spanish America, and chiefly in those of Santa Fé near Carthagena, and in the Bailiwick of Choco in Peru.

This metal was probably known to the workers of these mines long before it was brought into Europe: but as its colour is not very fine, and as it is almost intractable, especially by fusion, without addition, they seem to have neglected it, considering it as some refractory mineral or marcasite: some of them, however, had attempted to melt it, and to make toys of it, as tobacco-boxes and other things of that kind; but this must certainly have been by alloying it with other metals, as we shall soon see the impossibility of their doing it otherwise.

Nevertheless, this metal continued to be so neglected, that it was entirely unknown in Europe till Don Antonio Ulloa, a Spanish mathematician, who accompanied the French academicians sent by the king of France to Peru to determine the figure of the earth by measuring a degree of the meridian, first mentioned it in the relation of his voyage, printed at Madrid in the year 1748: but he says little of it, and represents it as an untractable metallic stone, which impeded the extraction of gold from the ore when it was in a large quantity. This account was not very likely to excite the curiosity of chemists concerning a new perfect metal, and a matter so interesting and surprising as they afterwards found it to be.

But before that time, that is, in 1741, an English metallurgist, called Wood, who had brought from Jamaica some specimens of it, which he was informed had come from Carthagena, attended more to it, and made some good chemical trials of it. Since that time, several chemists, the chief of which are M. Scheffer,

of the Swedish Academy, and Dr Lewis, of the Royal Society of London, have very particularly examined this singular metal, and have published their experiments. Dr Lewis has in some measure exhausted this matter, in four excellent memoirs communicated to the Royal Society. Platina was, nevertheless, little known in France till the year 1758, when Mr Morin collected, translated into French, and published, an account of all that had hitherto been done upon platina, in a work entitled, *Platina, white gold, an eighth metal*.

This publication excited the curiosity of French chemists, to whom it was a new and interesting object; but the difficulty of obtaining a matter so dear, prevented all of them from being able to satisfy their desire of examining it. Messrs Macquer and Beaumé were the only persons who made experiments upon it, which they have published amongst the *Memoirs of the Academy for the year 1751*.

About the same time also, Mr Margraaf examined platina, and published a dissertation concerning it.

These are the only chemists who have examined, at least who published their researches concerning this new metal. But although their number be small, yet their experiments are so numerous, made with such accuracy, and in general so consistent with each other, that, by collecting and comparing them, we may acquire a certain and almost as extensive knowledge of platina as of the other metals that have been known from time immemorial. The most general and certain results of the experiments made by the above-mentioned chemists are the following.

Platina, a Spanish word, is a diminutive of *plata*, which in that language signifies *silver*. It is therefore called by the Spaniards *little silver*. This name is improper; since it resembles silver only in being indestructible, and very imperfectly in its colour. The name of *white gold*, given to it by some chemists, is more suitable: for we shall see that it resembles gold more than any one metal resembles any other; and hence we shall chiefly compare it to gold.

We do not certainly know the origin and natural history of platina. We can only assert, that all that we see in masses, or worked into forms, is not pure nor in its natural state; for we are certain that it is unfusible, without addition, by the most violent fire of our furnaces, unless perhaps where the fire is blown up by dephlogisticated air, or when precipitated from aqua regia, as we shall afterwards see. All the platina that is found in the cabinets of curious persons consists of small angular grains, the corners of which are a little rounded. It is mixed with a considerable quantity of small black sand, as attractable by magnets as the best iron, but unfusible by acids, unfusible, and untractable. This sand is perfectly similar to that which is found at St Quay in Bretagne. The grains of platina are also frequently interperfered with particles of spar and of quartz, and sometimes with spangles of gold. Messrs Macquer and Beaumé found a pretty large spangle of gold in the platina examined by them. But these heterogeneous matters are quite foreign to platina, and are not combined with it; for it contains nothing extraneous excepting a little gold and mercury, which latter substance it probably receives

Platina.

during the operations for extracting gold from the ores by the means of mercury. These matters may easily be separated from the platina without decomposing it, by washing and by magnets. Some chemists, who know platina only by name, and deny that it is a peculiar metal, have therefore, with great impropriety, advanced, that Mr Margraaf had decomposed it, and had obtained from it gold, iron, and arsenic. The contrary appears from Mr Margraaf's Dissertation. Mr Margraaf only separated the heterogeneous matters which were merely mixed with platina, as other chemists have done; but he is too good a chemist to pretend that he has decomposed it: on the contrary, he does not hesitate to call it a *perfect metal*, which name is also given to it by all who understand metals.

The colour of the grains of platina is metallic, white, livid, not very brilliant, intermediate betwixt the white of silver and the grey of iron. At first view they resemble large slings of iron. They are smooth, and are nearly as hard as iron; they are somewhat ductile; so that some of them may be flattened upon an anvil, while others are bruised into small pieces.

The specific gravity of platina is very great, and nearly equal to that of gold. In water it loses only something betwixt an eighteenth and a nineteenth part of its weight.

The tenacity of the parts of this metal has not been determined, because it cannot be formed into a proper figure to make the experiment. But if this quality is proportionable to the ductility and hardness of metals, we may presume, that as platina is much harder than gold, its tenacity is also greater, if all the ductility of which it seems susceptible could be given to it by art.

Platina is, like pure gold and silver, free from all smell and taste. It is unalterable by the combined action of air and water, and is no more susceptible than the other perfect metals of acquiring rust. Like them also it is indestructible by the most violent and long-continued fire: but the property which peculiarly distinguishes this metal is its unfusibility by the most intense heat.

As fusion is necessary for the application of metals to use, chemists have made their utmost efforts to melt platina. The most violent heat which could be raised in air-furnaces, or by the united action of several large bellows, has been applied repeatedly, and continued a long time, without success. In all these trials, the grains of platina remained unaltered in form and weight, and were only agglutinated to each other, nearly as sand is by exposure to violent heat, but so slightly, that by the smallest effort they were separable. Messrs Macquer and Beaumé exposed platina during five days and five nights to the greatest heat of a glass-house furnace, which trial did only confirm the unfusibility and unalterability of platina by ordinary fires, as it was found to be only a little agglutinated, and its weight to be a little increased; which latter phenomenon has been also observed by Mr Margraaf, and which was undoubtedly owing to the fixed air absorbed by the scales of the imperfect metals mixed with it. Lastly, Messrs Macquer and Beaumé, having exposed platina to the focus of a large burning-

Platina.

glass, melted a little of it in a minute. It first smoked, then emitted sparks, and those parts of it melted well which were exposed to the centre of the focus. These chemists carefully examined the properties of this platina. According to their memoir, the melted parts were distinguishable from the others by a brilliancy like that of silver, and by a rounded, shining, polished surface. They were easily flattened upon an anvil, and formed into very thin plates without cracking or splitting; so that these grains seemed to be much more malleable than platina in its natural state. These metals by repeated strokes of the hammer became hard and brittle, as all other metals do, particularly gold and silver; and by annealing, their malleability was restored, as it is also to other metals by the same means. After experiments so certain and well authenticated, we cannot doubt that platina is truly a metal, and even a third metal, as perfect in its kind as gold and silver are in theirs. This proposition will be further confirmed by the other properties of platina.

Platina resists as perfectly as gold the action of the vitriolic, marine, or nitrous acids; in a word, of any pure acid, in whatever manner applied. These acids, concentrated or diluted, may be boiled any length of time upon platina without dissolving an atom of it: but a mixture of nitrous and marine acids, aqua regia, the solvent of gold, is also the solvent of platina. Messrs Macquer and Beaumé have observed, that an aqua regia composed of equal parts of the two acids dissolves most of this metal. But, however the aqua regia is made, more of it is required to dissolve platina than gold. These chemists employed a pound of aqua regia to dissolve an ounce of platina. All the acid of this quantity of aqua regia was not indeed employed to dissolve the platina, because much of it was dissipated in vapours during the operation, from the long time employed in the solution; and therefore, if the operation had been performed in close vessels, and by distillation and cohobation, as Dr Lewis did, a less quantity of aqua regia would have been sufficient: but this is a matter of small importance.

Aqua regia requires to be assisted by the heat of a sand-bath, and also a considerable time, to dissolve platina well. Although the colour of this metal is white, its solution is very yellow, even deeper than that of gold. When a small quantity of platina only is dissolved in aqua regia, or when a saturated solution is much diluted, a beautiful yellow colour is produced, undistinguishable from that of a solution of gold: but while the aqua regia becomes more and more saturated with platina, its colour becomes more and more intense, and at last red; but this apparent redness evidently proceeds from nothing but the intensity of the yellow colour; for this saturated solution is rendered yellow by dilution with water. In this circumstance it is similar to tincture of saffron.

The solution of platina in aqua regia is acid and corrosive, and from it a neutral crystallizable salt may be obtained. When the acids employed are concentrated, and when the solution is nearly saturated, a confused crystallization is formed at the bottom of the matrass, which may be found to be a heap of very small, yellow, transparent crystals. These crystals of platina may be obtained much larger and more beautiful by evaporating the solution of platina with a very slow

Platina. slow fire, and by cooling it very slowly. The solution of platina tinges the skin and other animal matters with a blackish brown colour in certain circumstances, (in which respect it resembles the solutions of gold, silver, and of mercury); and ether mixed with this solution by agitation quickly separates from it, and becomes tinged with a fine yellow colour, precisely as it does when it is treated in the same manner with a solution of gold. This experiment shews, that ether, and probably other attenuated oily matters, take platina, as they do gold, for aqua regia; and hence we may perceive another instance of the conformity of those two metals. But as ether does not acquire nearly so intense a colour as the solution of platina, we may infer that it only receives a small quantity of this metal. Besides, the platina soon separates spontaneously from the ether.

Platina may be precipitated from its solvent by fixed and volatile alkalis: and these precipitates are all of a yellow brick-colour, when only so much alkali is employed as is necessary to saturate the acid of the solution; but are of a paler colour when a superabundant quantity of alkali is employed, or when they are digested in alkali. Mr Margraaf mentions a very singular fact concerning the precipitation of platina by alkalis; namely, that although vegetable fixed alkali, and even volatile alkali, precipitated this metal from aqua regia; yet the mineral alkali, though in other instances equal in power of union to the former alkali, and superior to the latter, produced no precipitation, even when so much of it was added as to saturate the acid, nor even disturbed the transparency of the liquor. The above colours of precipitates of platina, according to Mr Macquer, proceed from a large quantity of saline matters which precipitate along with them, and which strongly adhere to them, and not from any calcination of this metal, or loss of its phlogiston. The proof of this is, that if the crystals or precipitates of platina be exposed to strong heat, the saline matters which adhere to them are expelled, the colour occasioned by them is lost, and the platina recovers, without any addition, its ordinary metallic state.—However, there is no reason here to suppose an adhesion of saline matter to the precipitate, which never can be proved, and besides is very improbable, since we know not any substance which has so great an attraction for salts as water. Under the article **PHLOGISTON**, it is explained how the calx of a metal may be revived merely by heat, without any apparent addition of phlogistic matter.

All the above-mentioned phenomena exhibited by platina treated with acids and alkalis are similar to those which gold exhibits in similar circumstances: but platina has also in this respect some peculiar properties, by which it differs from gold. 1. The solution of platina acquires a deeper colour than that of gold. 2. The precipitate of platina made by volatile alkali does not fulminate as that of gold does. 3. Tin does not produce from the solution of platina a purple precipitate, capable of tinging glass, as it does from a solution of gold.

Neither nitre, which quickly and effectually calcines all imperfect metals; nor corrosive sublimate, the acid of which, being very much concentrated, acts upon almost all metals; nor any other neutral salt, could

occasion the smallest alteration upon platina or upon gold.

This singular metal resists, as well as gold does, the action of sulphur, which so powerfully dissolves other metals. From Dr Lewis's experiments we find, that liver of sulphur is capable of dissolving platina, as it does also gold, by fusion. Mr Margraaf's experiments leave this matter uncertain: but if, as we have reason to believe, liver of sulphur does dissolve platina, this is another instance of the conformity of this metal with gold.

Almost all metallic substances are capable of separating platina from aqua regia, as they also separate gold. Platina precipitated by these substances has its metallic appearance. In this respect it conforms with a general rule, that metals precipitated by other metals have their metallic appearance.

Mr Margraaf relates, in his memoir, a great number of experiments which he made to discover the effects of mixing a solution of platina with other metallic solutions, and also of digesting pure platina with these solutions and other saline substances. These experiments furnished many curious and interesting facts; but as several of them do not seem to be consistent with the essential and ascertained properties of platina, nor even with similar experiments made by other chemists, there seems reason to believe that these singularities observed by this able chemist proceeded from some extraneous matters with which his platina was alloyed. From most of these experiments, as, for instance, from the yellow flowers obtained by subliming platina with sal ammoniac, and from the blue precipitate formed by mixing his solution of platina with a lixivium of Prussian blue, we may conclude, that iron was the metal with which his platina was alloyed, as he himself says.

Platina, like gold, is capable of being alloyed with all metals, and in these alloys exhibits interesting phenomena. Dr Lewis has examined these alloys more carefully and fully than any other person. The following is an epitome of Dr Lewis's observations on the subject.

Platina, although very unfusible when alone, may however be fused along with other metals with which it is capable of combining. Equal parts of gold and platina may be melted in a violent fire, and the alloy which is formed may be easily poured into an ingot mould. It is whitish, hard, and may be broken by a violent blow. Nevertheless, when it has been well annealed, it is capable of considerable extension under the hammer. One part of platina and four parts of gold may be melted and alloyed with a much less fire than is requisite in the preceding experiment. This alloy is so ductile, that it may be extended into very thin plates, without being broken, or even split at the edges. Dr Lewis observed a remarkable circumstance concerning this alloy, namely, that the platina, which was $\frac{1}{4}$ of the whole mass, rendered the gold no paler than guineas are, which contain only $\frac{1}{12}$ of silver.

Silver and platina may be melted and alloyed together in equal parts with a very violent fire. The alloy which is formed is much harder and darker-coloured than silver, and of a large grain, although it preserves some ductility. These qualities are less sensible when one part of platina is added to seven parts of the silver;

but this alloy is still coarser-grained and less white than silver. This coarseness of grain shows an imperfect union: and indeed silver and platina do not seem to unite very intimately; for Dr Lewis observes, that when the alloy of these two metals was left after fusion in the crucible, a considerable part of the platina was separated and sunk to the bottom. The platina did not appear to communicate any good quality to the silver, excepting a greater hardness.

Copper seems to be most improved by being alloyed with platina. When indeed a large proportion of platina is added to copper, as equal parts or two-thirds, the alloy is hard, brittle, and coarse; but when a less quantity of platina is added, as from $\frac{1}{2}$ to $\frac{1}{3}$, or even less, a golden-coloured copper is produced, very malleable, harder, fusible of a finer polish, smoother-grained, and much less subject to calcination and rust, than pure copper.

Dr Lewis was not able to fuse forged iron with platina; which is not surprising, when we consider the refractory qualities of these two metals: but he alloyed platina with cast-iron, by throwing one part of platina to four parts or more of the iron when it was just beginning to flow. This alloy was much harder, and much less subject to rust, than pure iron. It was fusible of a very fine polish.

Platina may be melted with tin in all proportions, from equal parts of the two metals to 24 parts of tin. This alloy was observed to be so much harder, more brittle, more dark-coloured, and coarser, as the proportion of the platina was larger. No advantage seemed to be acquirable by this alloy. Lead also may be alloyed in different proportions with platina, nearly as tin may; with this difference, that a much greater fire is necessary for the formation of this latter alloy, particularly when the quantity of platina is great. The metal resulting from it has a dark colour, somewhat approaching to a purple or violet, or it easily acquires these colours when exposed to the air. When the two metals fused together are left in a crucible to cool, a considerable part of the platina separates and falls to the bottom, in the same manner as it does from the alloy of silver.

From Dr Lewis's experiments, platina appears to be capable of amalgamating with mercury, but difficultly, and by a very long trituration with water, as, for instance, during a week.

If mercury be triturated with an alloy of gold and platina, it seizes the gold, and does not touch the platina. Dr Lewis proposes this amalgamation as a method of separating these two metals; and it is that which is employed in the ores of Peru, in which gold and platina are mixed together: but we do not yet know whether this separation be perfectly complete.

Platina may be alloyed with bismuth nearly as with lead, and in a similar manner separates from the bismuth after fusion. It gives to bismuth also, as it does to lead, the property of acquiring, by exposure to air, violet, purple, or blue colours. This alloy is always very brittle.

Of all metallic matters, zinc may be most easily alloyed with platina, and most effectually dissolved by fusion. Dr Lewis observed, that these alloys did not appear very different from pure zinc; but that when the proportion of platina is considerable, their grain is

closer, their colour less clear and more bluish, than of zinc. They do not tarnish nor change colours by exposure to air. Lastly, they are harder than zinc, and have not the semi-malleability of this semi-metal.

With regulus of antimony platina formed a darker and harder compound than the pure regulus.

Dr Lewis has combined platina at the same time with two metallic matters, such as with brass composed of copper and zinc, and with bronze composed of copper and tin. The most singular phenomenon of this latter alloy was, that the copper and tin acting conjointly upon the platina were capable of dissolving more of it than they both could do separately. This alloy was hard, and capable of receiving a fine polish, but is subject to tarnish; which seems to happen to all the alloys of tin or of lead with platina.

Equal parts of platina and brass formed a compound very hard and very brittle, capable of receiving a very fine polish, and not subject to tarnish. It is possible, therefore, that it might be employed for speculums of telescopes, and would be much preferable to those now used; all which have the great disadvantage of tarnishing by exposure to air, and even very quickly.

Dr Lewis does not mention the effects of alloying platina with arsenic; but Mr Scheffer affirms, that if only a twentieth part of arsenic be added to platina when red-hot in a crucible, these two substances will be perfectly fused, and will form a brittle gray mass. This remarkable experiment requires confirmation; for Mr Margraaf, having also treated these two matters together, did not perceive any such action of arsenic upon platina. From one of his experiments we find, that having exposed to a violent fire during an hour a mixture of an ounce of platina with a fusible glass, composed of eight ounces of minium, two ounces of flints, and one ounce of white arsenic, he obtained a regulus of platina, well united and fused, which weighed an ounce and 32 grains, the surface of which was smooth, white and shining, and the internal parts grey, but which nevertheless appeared sufficiently white when it was filed.

The cupellation of platina was one of the most important experiments to be made; because if this operation succeeded perfectly, we might thereby obtain compact and malleable masses of pure platina, in the same state as a metal which had been well fused, and of which all sorts of utensils might be made, if not by casting it, at least by forging. All the chemists who have examined this metal, and particularly Dr Lewis, have used their utmost endeavours to cupel it well. But although they have used every expedient to apply the strongest heat, they have not perfectly succeeded. The scorification proceeds well at the beginning of the operation, as when gold and silver are cupelled: but the cupellation afterwards becomes more and more difficult; because, as the quantity of lead diminishes, the matter becomes less and less fusible, and at last ceases to be fluid, notwithstanding the most violent heat; and also because, when the quantity of platina is greater than that of the lead, this latter metal is protected, and is not converted into litharge. Hence the regulus obtained is always dark-coloured, rough, adhering to the cupel, brittle, and weighing more than the platina originally employed, from the lead which remains united with it. Mess. Macquer and Beaumé appear

Platina. appear nevertheless to have carried this experiment further than any other chemists, as they kept the matter exposed to a violent fire during a longer time, that is, about 50 hours successively: therefore, although their platina was tarnished and rough on its surface, it was internally white and shining, easily separable from the cupel, and a little diminished in weight; a certain proof that no lead remained in it. This platina was also ductile, and capable of extension under the hammer.

Cupellation is therefore a certain method of applying platina to use, and of forming it into utensils.

Some further and very important experiments have been made on this singular metallic substance by Messrs. Buffon, De Lisle, and Morveau. M. Buffon separated, by means of a magnet, six parts out of seven of a parcel of platina. He distinguished two different matters in platina; of which one is black, friable, and attractable by magnets; and the other consists of larger grains, is of a livid white or yellowish colour, much less attractable, and is extensible. Between these two different matters are many intermediate particles, some partaking more of the former, and some of the latter. He thinks that the black matter is chiefly iron; and he says, that he has observed a similar black powder in many ores of iron. M. Morveau found, that a Prussian blue could be obtained from the black part of the platina, by pouring upon it spirit of nitre, and afterwards adding to the solution diluted some phlogisticated alkali; and that the particles of platina which could not be attracted by magnets, did not by this method shew any sign of their containing iron.

But the most important discovery that has been made concerning platina, is a method of melting it, by which it becomes a perfect metal, malleable, and denser than gold. M. De Lisle effected this, by dissolving crude platina in aqua regia, precipitating it from the acid menstruum by sal ammoniac, and by fusing this precipitate, without addition, in a double crucible, exposed to the intense heat of a forge-fire excited by double bellows. M. Morveau has repeated this experiment. From 72 grains of platina he obtained a regulus, which weighed 50½ grains, and seemed to have undergone a very imperfect fusion; for it did not adhere to the crucible, nor take its form, but seemed to be the platina merely revived. Its specific gravity also was found to be to that of water no more than as 10.045 to 1. But it was found to be nearly as malleable as silver; and when it had been sufficiently hammered, its specific gravity was found to be to water as 20.170 to 1. M. Morveau found that he could melt the precipitate with several fluxes; such as, a mixture of white glass, borax, and charcoal, and a mixture of white glass and neutral arsenical salt; and that the regulus thus obtained was more completely fused, but was not malleable, and was capable of being attracted by magnets; whereas the regulus obtained without addition did not give this mark of containing iron. He further found, that by means of the above-mentioned flux of white glass, borax, and charcoal, he could melt crude platina, and could alloy together platina and steel in various proportions.

The sciences, commerce, and arts, must receive great advantages from the application of a new perfect

metal to useful purposes, which to the fixity and indestructibility of gold, unites a hardness and solidity almost equal to those of iron; which is unalterable by the action of water and air; is not subject to rust; and refists, as well as glass or earthen vessels, all salts, even aquafortis and other pure acids. It is to be regretted, that, although large quantities of it are found in America, it is so exceedingly rare here.

The cause of this great scarcity of platina is, that the Spanish ministry have prohibited the sale of it, or the extraction of it from the mines. These prohibitions were certainly from good motives and wise intentions: for this metal was no sooner known, than it was employed for the adulteration of gold; for which purpose it is very fit, as it sustains all the ordinary trials of gold, has the same specific gravity, and renders gold much less pale than silver. The use of a metal with which frauds so prejudicial might be committed with impunity, was necessarily interdicted: but since the best chemists of Europe have examined platina, they have published certain and easy methods by which the smallest quantity of platina mixed with gold may be discovered, and by which these metals may be separated, in whatever proportion they may happen to be united. As a particular detail of these methods would exceed our bounds, we shall here relate only one of the most convenient and least troublesome. It is founded on a property which gold has, and not platina, of being capable of precipitation from aqua regia by martial vitriol; and upon a property which platina has, and not gold, of being capable of precipitation from aqua regia by sal ammoniac. When therefore we would discover if gold be alloyed with platina, let it be dissolved in aqua regia; and to this solution, which will contain both metals, let some sal ammoniac, dissolved in water, be added; upon which the platina will be precipitated in form of a brick-coloured sediment. If, on the other side, we would know if platina contained any gold, let this platina be dissolved in aqua regia, and to the solution add a solution of martial vitriol in water; upon which the liquor will become turbid, and the gold will form a precipitate which may be easily separated by decanting and filtering the liquor.

We may then affirm, that the reasons which induced the Spanish ministry to interdict the use of platina no longer subsist; and we hope, that, when they are once convinced of this, society shall no longer be deprived of a substance which may be so advantageous to them, and which may be a new source of wealth to the crown of Spain, the sole proprietor of this precious treasure.

* **PLATO**, a most illustrious philosopher of antiquity, was born at Athens about 430 B. C. He was a person of very great quality; being descended by his father's side from royal ancestors, and by his mother's side from Solon. He was educated in a manner suitable to his rank: he learned grammar, mathematics, music, and painting. In his first years he addicted himself much to poetry; he wrote odes and dithyrambs first, and afterwards epic poetry: which last, finding much inferior to Homer's, he burned. Then he betook himself to writing tragedies, and had prepared one to contend for the prize at the Olympic theatre: but the day before it should have been presented, he happened to hear Socrates, and was so charmed

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charmed with his way of discoursing, that he not only forbore the contest at that time, but neglected poetry ever after, and even destroyed all his poems.

He was about the 20th year of his age, when he became a follower of Socrates, and began to study philosophy. This great master, soon observing in Plato a greater genius than common, was mightily taken with him: he advised him to read Homer often; and from thence Plato brought himself to conceive and speak of things in a lofty, copious, and striking manner. Plato was equally attached to Socrates: he raised a considerable sum of money to procure his release, after he was imprisoned upon the accusations of his enemies; and when this failed, had the boldness to harangue in defence of him to the people, which he began to do so pathetically, that the magistrates, fearing a tumult, caused him to be silenced. Eight years he lived with Socrates; in which time he committed, as did Xenophon and his other disciples, the substance of his master's discourses to writing. Of this he composed dialogues; but with so great additions of his own, that Socrates, hearing him recite his *Lyfiss*, cried out, "O Hercules! how many things does this young man feign of me!" for, as *Luertius* adds, many of those things which Plato writ, Socrates never spake.

The philosophers who were at Athens were so alarmed at the death of Socrates, that most of them fled the city to avoid the injustice and cruelty of the government. Plato, whose grief upon this occasion is said by *Plutarch* to have been excessive, retired to Megara; where he was friendly entertained by *Euclyd*, who had been one of Socrates's first scholars, till the storm was over. Afterwards he determined to travel in pursuit of knowledge; and from Megara he went to Italy, where he conferred with *Eurytus*, *Philolaus*, and *Archytas*. These were the most celebrated of the followers of *Pythagoras*, whose doctrine was then become famous in Greece; and from these the *Pythagoreans* have affirmed that he had all his natural philosophy. He dived into the most profound and mysterious secrets of the *Pythagoric* doctrines; and perceiving other knowledge to be connected with them, he went to *Cyrene*, where he learned geometry of *Theodorus* the mathematician. From thence he passed into Egypt, to acquaint himself with the theology of their priests, to study more nicely the proportions of geometry, and to instruct himself in astronomical observations; and having taken a full survey of all the country, he settled for some time in the province of *Sais*, learning of the wise men there, what they held concerning the universe, whether it had a beginning, whether it moved wholly or in part, &c.; and *Pausanias* affirms, that he learned from these the immortality, and also the transmigration, of souls. Some of the fathers will have it, that he had communication with the books of *Moses*, and that he studied under one *Sechnuphis*, a learned man of *Heliopolis*, who was a Jew: but there is nothing that can be called evidence for these assertions. *St. Austin* once believed that Plato had some conference with *Jeremiah*; but afterwards discovered, that that prophet must have been dead at least 60 years before Plato's voyage to Egypt.

Plato's curiosity was not yet satisfied. He travelled into Persia, to consult the magi about the religion of

that country: and he designed to have penetrated even to the Indies, and to have learned of the *Brachmans* their manners and customs; but the wars in Asia hindered him.

Being returned to Athens from his travels, he applied to the teaching philosophy, which at that time was the most honourable profession there. He set up his school in the academy, a place of exercise in the suburbs of the city, beset with woods; and this, not being a very healthy situation, brought a quartan ague on him, which lasted 18 months. The physicians advised him to remove to the *Lyceum*; but he refused, and answered, "I would not live on the top of *Athos*, to linger away life:" and it was from the academy, that his sect took the name of *Academic*. Yet settled as he was, he afterwards made several voyages abroad: one particularly to Sicily, in order to view the fiery ebullitions of Mount *Ætna*. *Dionysius* the tyrant reigned then at *Syracuse*; a very bad man; for, as *Cicero* relates, after he had robbed a temple at *Locris*, and was returning by sea to Sicily with a prosperous gale, he said to his companions, "You see, my friends, how the gods favour filarilege." Plato went to see him; but instead of flattering him like a courtier, reproved him for the disorders of his court and the injustice of his government. The tyrant, not used to disagreeable truths, grew enraged at Plato; and would have put him to death, if *Dion* and *Aristomenes*, formerly his scholars, and then favourites of that prince, had not powerfully interceded in his behalf. *Dionysius* was content to deliver him into the hands of an envoy of the *Lacedæmonians*, who were then at war with the *Athenians*; and this envoy, touching upon the coast of *Ægina*, sold him for a slave to a merchant of *Cyrene*, who as soon as he had bought him sent him away to Athens. Some time after, he made a second voyage into Sicily in the reign of *Dionysius* the Younger; who sent *Dion*, his minister and favourite, to invite him to court, that he might learn from him the art of governing his people well. Plato accepted the invitation, and went; but the intimacy between *Dion* and Plato raising jealousy in the tyrant, the former was disgraced, and the latter sent back to Athens.

His fame was now spread far and wide; and several states, among which were the *Arcadians* and *Thebans*, sent ambassadors with earnest requests that he would come over, not only to instruct the young men in philosophy, but also to prescribe them laws of government. The *Cyrenians*, *Syracusanians*, *Cretans*, and *Eleans*, sent also to him: he did not go to any of them, but gave laws and rules of governing to all. He lived single, yet soberly and chastity. He was a man of great virtues, and exceedingly affable; of which we need no greater proof, than his civil manner of conversing with the philosophers of his own times, when pride and envy were at their height. His behaviour to *Diogenes* is always mentioned in his history. The *Cynic* was vastly offended, it seems, at the politeness and fine taste of Plato, and used to catch all opportunities of snarling at him. He dined one day at his table with other company, and trampling upon the tapestry with his dirty feet, uttered this brutish sarcasm, "I trample upon the pride of Plato;" to which Plato wisely reparted, "With greater pride."

The same of Plato drew disciples to him from all parts:

Plato.

parts: among whom were Speusippus, an Athenian, his sister's son, whom he appointed his successor in the academy; the great Aristotle; two ladies, Læsthenia a Mantinian, and Axiothia a Phliæian, who went habited as men, and thereby gave occasion to injurious suspicions of Plato; Hyperides, Demosthenes, and Isocrates, with the last of whom Plato was very intimate. In the mean time, as his great reputation gained him on the one hand many disciples and admirers, so on the other it raised him some emulators, especially among his fellow-disciples, the followers of Socrates. Xenophon and he were particularly disaffected towards each other; and their emulation appears in nothing more than in their having written upon the same subjects. They both writ a *Symposium*: they both writ about Socrates: they both writ upon government; for the Commonwealth of Plato, and the Institution of Cyrus, are works of the same nature; the latter being pronounced by Cicero, as much a work of invention as the former.

This extraordinary man, being arrived at 81 years of age, died a very easy and peaceable death, in the midst of an entertainment, according to some; but, according to Cicero, as he was writing. Both the life and death of this philosopher were calm and undisturbed; and indeed he was finely composed for happiness. Besides the advantages of a noble birth, he had a large and comprehensive understanding, a vast fund of wit and good taste, great evenness and sweetness of temper, all cultivated and refined by education and travel; so that it is no wonder if he was honoured by his countrymen, esteemed by strangers, and adored by his scholars. The ancients thought more highly of Plato than of all their philosophers: they always called him the *Divine Plato*, and they seemed resolved that his descent should be more than human. "There are (says Apuleius) who assert Plato to have been sprung from a more sublime conception; and that his mother Perictione, who was a very beautiful woman, was impregnated by Apollo in the shape of a spectre." Plutarch, Suidas, and others, affirm this to have been the common report at Athens. When he was an infant, his father Aristo went to Hymettus, with his wife and child, to sacrifice to the muses; and while they were busied in the divine rites, a swarm of bees came and distilled their honey upon his lips. This, says Tully, was considered as a preface of his future eloquence. Apuleius relates, that Socrates, the night before Plato was recommended to him, dreamed that a young swan fled from Cupid's altar in the academy, and settled in his lap, thence soared to heaven, and delighted the gods with its music; and when Aristo the next day presented Plato to him, "Friends (says Socrates), this is the swan of Cupid's academy." The Greeks loved fables: they show however in the present case, what exceeding respect was paid to the memory of Plato. Tully perfectly adored him; tells us, how he was justly called by Panætius the *divine*, the *most wise*, the *most sacred*, the *Homer of philosophers*; entitled him to Atticus, *Deus ille nostris*; thinks, that if Jupiter had spoken Greek, he would have spoken in Plato's language; and made him so implicitly his guide in wisdom and philosophy, as to declare, that he had rather err with Plato than be right with any one else. But, panegyric aside, Plato was certainly a very wonderful man, of a large

and comprehensive mind, an imagination infinitely fertile, and of a most flowing and copious eloquence. Nevertheless, the strength and heat of fancy prevailing in his composition over judgment, he was too apt to soar beyond the limits of earthly things, to range in the imaginary regions of general and abstracted ideas; and on which account, though there is always a greatness and sublimity in his manner, he did not philosophise so much according to truth and nature as Aristotle, though Cicero did not scruple to give him the preference.

The writings of Plato are all in the way of dialogue; where he seems to deliver nothing for himself, but every thing as the sentiments and opinions of others, of Socrates chiefly, of Timæus, &c. He does not mention himself any where, except once in his *Phædo*, and another time in his *Apology* for Socrates. His style, as Aristotle observed, is betwixt prose and verse: on which account, some have not scrupled to rank him with the poets. There is a better reason for so doing, than the elevation and grandeur of his style: his matter is oftentimes the offspring of imagination, instead of doctrines or truths deduced from nature. The first edition of Plato's works in Greek was put out by Aldus at Venice in 1513: but a Latin version of him by Marcellus Ficinus had been printed there in 1491. They were re-printed together at Lyons in 1588, and at Frankfurt in 1602. The famous printer Henry Stephens, in 1578, gave a most beautiful and correct edition of Plato's works at Paris, with a new Latin version by Serranus, in three volumes folio; and this deservedly passes for the best edition of Plato: yet Serranus's version is very exceptionable, and in many respects, if not in all, inferior to that of Ficinus.

PLATONIC, something that relates to Plato, his school-philosophy, opinions, or the like. Thus, platonic love denotes a pure spiritual affection, for which Plato was a great advocate, subsisting between the different sexes, abstracted from all carnal appetites, and regarding no other object but the mind and its beauties: or it is even a sincere disinterested friendship subsisting between persons of the same sex, abstracted from any selfish views, and regarding no other object than the person, if any such love or friendship has aught of a foundation in nature.

PLATONIC Year, or the *Great Year*, is a period of time determined by the revolution of the equinoxes, or the space wherein the stars and constellations return to their former places, in respect of the equinoxes. The platonic year, according to Tycho Brahe, is 25816, according to Ricciolus 25920, and according to Cassini 24800 years.

This period once accomplished, it was an opinion among the ancients, that the world was to begin anew, and the same series of things to turn over again.

PLATONISM, the doctrine and sentiments of Plato and his followers, with regard to philosophy, &c.

In physics, Plato followed Heraclitus; in ethics and politics, Socrates; and in metaphysics he followed Pythagoras. His disciples were called *academics*. See the articles **ACADEMIC**, &c.

The Platonic philosophy is thought very consistent with the Mosaic; and a great many of the primitive fathers follow the opinions of that philosopher, as being favourable to Christianity. Justin is of opinion, that

Plato
||
Platonism.

Plautus,
Plea.

Plea.

that Plato should not learn many things which he has said in his works, from mere natural reason; but thinks he might have learned them from the books of Moses, which he might have read when in Egypt.

PLAUTUS (Marcus Accius), a comic writer of ancient Rome, born at Umbria, a province of Italy. His proper name was *Marcus Accius*, and he is supposed to have acquired the surname of *Plautus* from having splay feet. His parentage appears to have been mean; so that some have thought he was the son of a slave. Aulus Gellius says that Plautus was distinguished for his poetry on the theatre, and Cato for his eloquence in the Forum, at the same time; and observes elsewhere from Varro, that he was so well paid for his plays, as to double his stock in trading, in which he lost all he gained by the muses. He is said to have been reduced to work at a mill for his subsistence; but Varro adds, that his wit was his best support, as he composed three of his plays during this drudgery. He died in the first year of the elder Cato's censorship, about the year of Rome 569, and 184 B. C. We have 20 of his plays extant, though not all of them entire. Five of them comedies have been elegantly translated into English by Mr B. Thornton, and published in 2 vols 8vo. 1767.

PLEA, in law, is what either party alleges for himself in court, in a cause there depending; and in a more restrained sense, it is the defendant's answer to the plaintiff's declaration.

Pleas are usually divided into those of the crown, and common pleas. Pleas of the crown are all suits in the king's name, or in the name of the attorney-general in behalf of the king, for offences committed against his crown and dignity, and against his peace; as treason, murder, felony, &c. See ARRAIGNMENT.

Common pleas are such suits as are carried on between common persons in civil cases. These pleas are of two sorts; *dilatory* pleas, and pleas to the *action*. Dilatory pleas are such as tend merely to delay or put off the suit, by questioning the propriety of the remedy, rather than by denying the injury: pleas to the action are such as dispute the very cause of suit.

I. *Dilatory* pleas are, 1. To the jurisdiction of the court: alleging, that it ought not to hold plea of this injury, it arising in Wales or beyond sea; or because the land in question is of ancient demesne, and ought only to be demanded in the lord's court, &c. 2. To the disability of the plaintiff, by reason whereof he is incapable to commence or continue the suit; as, that he is an alien enemy, outlawed, excommunicated, attainted of treason or felony, under a præmunire, not in *rerum natura* (being only a fictitious person), an infant, a feme-covert, or a monk professed. 3. In abatement: which abatement is either of the writ, or the count, for some defect in one of them; as by misnaming the defendant, which is called a *misnomer*; giving him a wrong addition, as esquire instead of knight; or other want of form in any material respect. Or, it may be that the plaintiff is dead; for the death of either party is at once an abatement of the suit.

These pleas to the jurisdiction, to the disability, or in abatement, were formerly very often used as mere dilatory pleas, without any foundation in truth, and calculated only for delay; but now by stat. 4 & 5 Ann. c. 16. no dilatory plea is to be admitted without affi-

davit made of the truth thereof, or some probable matter shown to the court to induce them to believe it true. And with respect to the pleas themselves, it is a rule, that no exception shall be admitted against a declaration or writ, unless the defendant will in the same plea give the plaintiff a better; that is, shew him how it might be amended, that there may not be two objections upon the same account.

All pleas to the jurisdiction conclude to the cognizance of the court; praying "judgment whether the court will have farther cognizance of the suit." Pleas to the disability conclude to the person; by praying "judgment, if the said A the plaintiff ought to be answered:" And pleas in abatement (when the suit is by original) conclude to the writ or declaration; by praying "judgment of the writ, or declaration, and that the same may be quashed," *castetur*, made void, or abated; but if the action be by bill, the plea must pray "judgment of the bill," and not of the declaration; the bill being here the original, and the declaration only a copy of the bill.

When these dilatory pleas are allowed, the cause is either dismissed from that jurisdiction, or the plaintiff is stayed till his disability be removed; or he is obliged to sue out a new writ, by leave obtained from the court, or to amend and new-frame his declaration. But when, on the other hand, they are overruled as frivolous, the defendant has judgment of *respondere ouster*, or to answer over in some better manner. It is then incumbent on him to plead.

2. A plea to the *action*; that is, to answer to the merits of the complaint. This is done by confessing or denying it.

A confession of the whole complaint is not very usual, for then the defendant would probably end the matter sooner; or not plead at all, but suffer judgment to go by default. Yet sometimes, after tender and refusal of a debt, if the creditor harasses his debtor with an action, it then becomes necessary for the defendant to acknowledge the debt, and plead the tender; adding that he has always been ready, *tout temps prêt*, and still is ready, *uncore prêt*, to discharge it: for a tender by the debtor and refusal by the creditor will in all cases discharge the costs, but not the debt itself; though in some particular cases the creditor will totally lose his money. But frequently the defendant confesses one part of the complaint (by a *cognovit actionem* in respect thereof), and traverses or denies the rest; in order to avoid the expence of carrying that part to a formal trial, which he has no ground to litigate. A species of this sort of confession is the *payment of money into court*: which is for the most part necessary upon pleading a tender, and is itself a kind of tender to the plaintiff; by paying into the hands of the proper officer of the court as much as the defendant acknowledges to be due, together with the costs hitherto incurred, in order to prevent the expence of any farther proceedings. This may be done upon what is called a *motion*; which is an occasional application to the court by the parties or their counsel, in order to obtain some rule or order of court, which becomes necessary in the progress of a cause; and it is usually grounded upon an *affidavit*, (the perfect tense of the verb *affido*), being a voluntary oath before some judge or officer of the court, to convince

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vince the truth of certain facts, upon which the motion is grounded: though no such affidavit is necessary for payment of money into court. If, after the money is paid in, the plaintiff proceeds in his suit, it is at his own peril: for if he does not prove more due than is so paid into court, he shall be non-suited and pay the defendant's costs; but he shall still have the money so paid in, for that the defendant has acknowledged to be his due. To this head may also be referred the practice of what is called a *set off*: whereby the defendant acknowledges the justice of the plaintiff's demand on the one hand; but on the other, sets up a demand of his own, to counterbalance that of the plaintiff, either in the whole or in part: as, if the plaintiff sues for ten pounds due on a note of hand, the defendant may set off nine pounds due to himself for merchandize sold to the plaintiff; and, in case he pleads such set-off, must pay the remaining balance into court.

Pleas that totally deny the cause of complaint are either the general issue, or a special plea in bar.

1. The *general issue*, or general plea, is what traverses, thwarts, and denies at once, the whole declaration, without offering any special matter whereby to evade it. As in trespass either *vi et armis*, or on the case, "*non culpabilis, not guilty*;" in debt upon contract, "*nihil debet, he owes nothing*;" in debt on bond, "*non est factum, it is not his deed*;" on an *assumpsit*, "*non assumpsit, he made no such promise*." Or in real actions, "*null tort, no wrong done*;" *null disseisin, no disseisin*;" and in a writ of right, the mise or issue is, that "the tenant has more right to hold than the demandant has to demand." These pleas are called the *general issue*, because, by importing an absolute and general denial of what is alleged in the declaration, they amount at once to an issue; by which we mean a fact affirmed on one side and denied on the other.

2. *Special pleas* in bar of the plaintiff's demands are very various, according to the circumstances of the defendant's case. As, in real actions, a general release or a fine; both of which may destroy and bar the plaintiff's title. Or, in personal actions, an accord, arbitration, conditions performed, nonage of the defendant, or some other fact which precludes the plaintiff from his action. A *justification* is likewise a special plea in bar; as in actions of assault and battery, *son assault demesne*, that it was the plaintiff's own original assault; in trespass, that the defendant did the thing complained of in right of some office which warranted him so to do; or, in an action of slander, that the plaintiff is really as bad a man as the defendant said he was.

Also a man may plead the statutes of limitation in bar; or the time limited by certain acts of parliament, beyond which no plaintiff can lay his cause of action. This, by the statute of 32 Hen. VIII. c. 2. in a writ of right is 60 years: in assises, writs of entry, or other possessory actions real, of the seisin of one's ancestors in lands; and either of their seisin, or one's own, in rents, suits, and services, 50 years: and in actions real for lands grounded upon one's own seisin or possession, such possession must have been within 30 years. By statute 1 Mar. II. c. 5. this limitation does not extend to any suit for avowfolds. But by the statute

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21 Jac. I. c. 2. a time of limitation was extended to the case of the king; viz. 60 years precedent to 19th Feb. 1623: but, this becoming ineffectual by efflux of time, the same date of limitation was fixed by statute 9 Geo. III. c. 16. to commence and be reckoned backwards, from the time of bringing any suit or other process to recover the thing in question; so that a possession for 60 years is now a bar even against the prerogative, in derogation of the ancient maxim, *Nullum tempus occurrit regi*. By another statute, 21 Jac. I. c. 16. 20 years is the time of limitation in any writ of freedom: and, by a consequence, 20 years is also the limitation in every action of ejectment; for no ejectment can be brought, unless where the lessor of the plaintiff is entitled to enter on the lands, and by the statute 21 Jac. I. c. 16. no entry can be made by any man, unless within 20 years after his right shall accrue. Also all actions of trespass (*quare clausum fregit*, or otherwise) detinue, trover, replevin, account, and case, (except upon accounts between merchants), debt on simple contract, or for arrears of rent, are limited by the statute last mentioned to six years after the cause of action commenced: and actions of assault, menace, battery, mayhem, and imprisonment, must be brought within four years, and actions for words two years, after the injury committed. And by the statute 31 Eliz. c. 5. all suits, indictments, and informations, upon any penal statutes, where any forfeiture is to the crown, shall be sued within two years, and where the forfeiture is to a subject, within one year, after the offence committed, unless where any other time is specially limited by the statute. Lastly, by statute 10 W. III. c. 14. no writ of error, *scire facias*, or other suit, shall be brought to reverse any judgment, fine, or recovery, for error, unless it be prosecuted within 20 years. The use of these statutes of limitation is to preserve the peace of the kingdom, and to prevent those innumerable perjuries which might ensue if a man were allowed to bring an action for any injury committed at any distance of time. Upon both these accounts the law therefore holds, that *interest reipublice ut sit finis litium*: and upon the same principle the Athenians laws in general prohibited all actions where the injury was committed five years before the complaint was made. If therefore, in any suit, the injury, or cause of action, happened earlier than the period expressly limited by law, the defendant may plead the statutes of limitations in bar: as upon an *assumpsit*, or promise to pay money to the plaintiff, the defendant may plead, *Non assumpsit infra sex annos*. He made no such promise within six years; which is an effectual bar to the complaint.

An *estoppel* is likewise a special plea in bar; which happens where a man hath done some act, or executed some deed, which estops or precludes him from averring any thing to the contrary. As if a tenant for years (who hath no freehold) levies a fine to another person. Tho' this is void as to strangers, yet it shall work as an estoppel to the cognizor; for, if he afterwards brings an action to recover these lands, and his fine is pleaded against him, he shall thereby be estopped from saying, that he had no freehold at the time, and therefore was incapable of levying it.

The conditions and qualities of a plea (which, as well

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well as the doctrine of estoppels, will also hold equally, *mutatis mutandis*, with regard to other parts of pleading), are, 1. That it be single and containing only one matter; for duplicity begets confusion. But by statute 4 & 5 Ann. c. 16. a man, with leave of the court, may plead two or more distinct matters or single pleas; as in an action of assault and battery, these three, Not guilty, *son assault demesne*, and the statute of limitations. 2. That it be direct and positive, and not argumentative. 3. That it have convenient certainty of time, place, and persons. 4. That it answer the plaintiff's allegations in every material point. 5. That it be so pleaded as to be capable of trial.

Special pleas are usually in the affirmative, sometimes in the negative, but they always advance some new fact not mentioned in the declaration; and then they must be averred to be true in the common form:—"And this he is ready to verify."—This is not necessary in pleas of the general issue, those always containing a total denial of the facts before advanced by the other party, and therefore putting him upon the proof of them. See PLEADINGS.

PLEA to Indictment, the defensive matter alleged by a criminal on his indictment: (See ARRAIGNMENT.) This is either, 1. A plea to the jurisdiction; 2. A demurrer; 3. A plea in abatement; 4. A special plea in bar; or, 5. The general issue.

I. A plea to the *jurisdiction*, is where an indictment is taken before a court that hath no cognizance of the offence; as if a man be indicted for a rape at the sheriff's tourn, or for treason at the quarter-sessions; in these or similar cases, he may except to the jurisdiction of the court, without answering at all to the crime alleged.

II. A *demurrer* to the indictment, is incident to criminal cases, as well as civil, when the fact as alleged is allowed to be true, but the prisoner joins issue upon some point of law in the indictment, by which he insists, that the fact, as stated, is no felony, treason, or whatever the crime is alleged to be. Thus, for instance, if a man be indicted for feloniously stealing a gre-hound; which is an animal in which no valuable property can be had, and therefore it is not felony, but only a civil trespass, to steal it; in this case the party indicted may demur to the indictment; denying it to be felony, though he confesses the act of taking it. Some have held, that if, on demurrer, the point of law be adjudged against the prisoner, he shall have judgment and execution, as if convicted by verdict. But this is denied by others, who hold, that in such case he shall be directed and received to plead the general issue, Not guilty, after a demurrer determined against him. Which appears the more reasonable, because it is clear, that if the prisoner freely discovers the fact in court, and refers it to the opinion of the court whether it be felony or no; and upon the fact thus shewn, it appears to be felony, the court will not record the confession, but admit him afterwards to plead not guilty. And this seems to be a case of the same nature, being for the most part a mistake in point of law, and in the conduct of his pleading; and, though a man by mispleading may in some cases lose his property, yet the law will not suffer him by such niceties to lose his life. However, upon this doubt, demurrers

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to indictments are seldom used: since the same advantages may be taken upon a plea of not guilty; or afterwards, in arrest of judgment, when the verdict has established the fact.

III. A plea in *abatement* is principally for a *misnomer*, a wrong name, or a false addition to the prisoner. As, if James Allen, gentleman, is indicted by the name of *John Allen, esquire*, he may plead that he has the name of *Jamer*, and not of *John*; and that he is a *gentleman*, and not an *esquire*. And, if either fact is found by a jury, then the indictment shall be abated, as writs or declarations may be in civil actions. But, in the end, there is little advantage accruing to the prisoner by means of these dilatory pleas; because, if the exception be allowed, a new bill of indictment may be framed, according to what the prisoner in his plea avers to be his true name and addition. For it is a rule, upon all pleas in abatement, that he who takes advantage of a flaw, must at the same time shew how it may be amended. Let us therefore next consider a more substantial kind of plea, *viz.*

IV. Special pleas in *bar*; which go to the merits of the indictment, and give a reason why the prisoner ought not to answer it at all, nor put himself upon his trial for the crime alleged. These are of four kinds; a former acquittal, a former conviction, a former attainer, or a pardon. There are many other pleas which may be pleaded in bar of an appeal: but these are applicable to both appeals and indictments.

1. First, the plea of *autrefois acquit*, or a former acquittal, is grounded on this universal maxim of the common law of England, that no man is to be brought into jeopardy of his life, more than once, for the same offence. And hence it is allowed as a consequence, that when a man is once fairly found not guilty upon any indictment, or other prosecution, before any court having competent jurisdiction of the offence, he may plead such acquittal in bar of any subsequent accusation for the same crime.

2. Secondly, the plea of *autrefois convict*, or a former conviction for the same identical crime, though no judgment was ever given, or perhaps will be, (being suspended by the benefit of clergy or other causes), is a good plea in bar to an indictment. And this depends upon the same principle as the former, that no man ought to be twice brought in danger of his life for one and the same crime.

3. Thirdly, the plea of *autrefois attain*, or a former attainer, is a good plea in bar, whether it be for the same or any other felony. For wherever a man is attainted of felony, by judgment of death either upon a verdict or confession, by outlawry, or heretofore by abjuración, and whether upon an appeal or an indictment; he may plead such attainer in bar to any subsequent indictment or appeal, for the same or for any other felony. And this because, generally, such proceeding on a second prosecution cannot be to any purpose; for the prisoner is dead in law by the first attainer, his blood is already corrupted, and he hath forfeited all that he had: so that it is absurd and superfluous to endeavour to attain him a second time. Though to this general rule, as to all others, there are some exceptions; wherein, *cessante ratione, cessat et ipsa lex*.

4. Lastly,

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4. Lastly, a pardon may be pleaded in bar; as at once destroying the end and purpose of the indictment, by remitting that punishment, which the prosecution is calculated to inflict. There is one advantage that attends pleading a pardon in bar, or in arrest of judgment, before sentence is past; which gives it by much the preference to pleading it after sentence or attainder. This is, that by stopping the judgment it stops the attainder, and prevents the corruption of the blood: which, when once corrupted by attainder, cannot afterwards be restored, otherwise than by act of parliament.

V. The *general issue*, or plea of not guilty, upon which plea alone the prisoner can receive his final judgment of death. In case of an indictment of felony or treason, there can be no special justification put in by way of plea. As, on an indictment for murder, a man cannot plead that it was in his own defence against a robber on the highway, or a burglar; but he must plead the general issue, Not guilty, and give this special matter in evidence. For (besides that these pleas do in effect amount to the general issue; since, if true, the prisoner is most clearly not guilty) as the facts in treason are laid to be done *proditore et contra ligeantie sue debitum*; and, in felony, that the killing was done *felonice*; these charges, of a traitorous or felonious intent, are the points and very gist of the indictment, and must be answered directly, by the general negative, Not guilty; and the jury upon the evidence will take notice of any defensive matter, and give their verdict accordingly as effectually as in if it were or could be specially pleaded. So that this is, upon all accounts, the most advantageous plea for the prisoner.

When the prisoner hath thus pleaded not guilty, *non culpabilis*, or *nient culpable*: which was formerly used to be abbreviated upon the minutes, thus, *Non* (or *nient*) *cul.* the clerk of the assize, or clerk of arraigns, on behalf of the crown replies, that the prisoner is guilty, and that he is ready to prove him so. This is done by two monosyllables in the same spirit of abbreviation, *cul. prit.* which signifies first that the prisoner is guilty, (*cul. culpable*, or *culpabilis*); and then that the king is ready to prove him so, (*prit.*, *præsto sum*, or *paratur, verificare*). By this replication the king and the prisoner are therefore at issue: for when the parties come to a fact which is affirmed on one side and denied on the other, then they are said to be at issue in point of fact: which is evidently the case here, in the plea of *non cul.* by the prisoner; and the replication of *cul.* by the clerk.

How the courts came to express a matter of this importance in so odd and obscure a manner, can hardly be pronounced with certainty. It may perhaps, however, be accounted for by supposing, that these were at first short notes, to help the memory of the clerk, and remind him what he was to reply; or else it was the short method of taking down in court, upon the minutes, the replication and averment; *cul. prit.* which afterwards the ignorance of succeeding clerks adopted for the very words to be

by them spoken (A).

But however it may have arisen, the joining of issue seems to be clearly the meaning of this obscure expression; which has puzzled our most ingenious etymologists, and is commonly understood as if the clerk of the arraigns, immediately on plea pleaded, had fixed an opprobrious name on the prisoner, by asking him, "*culprit*, how wilt thou be tried?" for immediately upon issue joined it is inquired of the prisoner, by what trial he will make his innocence appear. This form has at present reference to appeals and approvements only, wherein the appellee has his choice, either to try the accusation by BATTLE or by JURY. But upon indictments, since the abolition of ORDEAL, there can be no other trial but by jury, *per pais*, or by the country: and therefore, if the prisoner refuses to put himself upon the inquest in the usual form, that is, to answer that he will be tried by God and the country, if a commoner; and, if a peer, by God and his peers; the indictment, if in treason, is taken *pro confesso*; and the prisoner, in cases of felony, is judged to stand mute, and, if he perseveres in his obduracy, shall now be convicted of the felony.

When the prisoner has thus put himself upon his trial, the clerk answers in the humane language of the law, which always hopes that the party's innocence rather than his guilt may appear, "God fend thee a good deliverance." And then they proceed, as soon as conveniently may be, to the trial. See the article TRIAL.

PLEADINGS, in law, are the mutual allegations between the plaintiff and defendant, (see SUIT, WRIT, and PROCESS). They form the third part or stage of a fact; and at present are set down and delivered into the proper office in writing, though formerly they were usually put in by their counsel *ore tenus*, or *viva voce*, in court, and then minuted down by the chief clerks or prothonotaries; whence, in our old law-French, the pleadings are frequently denominated the *parol*.

The first of these is the *declaration, narratio*, or *count*, anciently called the *tale*; in which the plaintiff sets forth his cause of complaint at length: being indeed only an amplification or exposition of the original writ upon which his action is founded, with the additional circumstances of time and place, when and where, the injury was committed. Black's Comment.

In *local actions*, where possession of land is to be recovered, or damages for an actual trespass, or for waste, &c. affecting land, the plaintiff must lay his declaration, or declare his injury to have happened in the very county and place that it really did happen; but in *transitory actions*, for injuries that might have happened any where, as debt, detinue, slander, and the like, the plaintiff may declare in what county he pleases, and then the trial must be in that county in which the declaration is laid. Though, if the defendant will make affidavit that the cause of action, if any, arose not in that but in another county, the court will direct a change of the *venue* or *vifue*, (that is, the *vicinia* or neighbourhood in which the injury

(A) Of this ignorance we may see daily instances, in the abuse of two legal terms of ancient French: one, the prologue to all proclamations, "*Oyez*, or *Hear ye*," which is generally pronounced, most unmeaningly, "O yes;" the other, a more pardonable mistake, viz. when a jury are all sworn, the officer bids the crier number them, for which the word in law-French is, "*Countez*;" but we now hear it pronounced in very good English, "Count these."

Pleadings. is declared to be done), and will oblige the plaintiff to declare in the proper county. For the statute 6 Ric. II. c. 2. having ordered all writs to be laid in their proper counties, this, as the judges conceived, empowered them to change the *venue*, if required, and not to insist rigidly on abating the writ: which practice began in the reign of James the first. And this power is discretionally exercised, so as not to cause but prevent a defect of justice. Therefore the court will not change the *venue* to any of the four northern counties, previous to the spring circuit; because there the assizes are holden only once a-year, at the time of summer circuit. And it will sometimes remove the *venue* from the proper jurisdiction, (especially of the narrow and limited kind), upon a suggestion, duly supported, that a fair and impartial trial cannot be had therein.

It is generally usual, in actions upon the case, to set forth several cases, by different counts in the same declaration; so that if the plaintiff fails in the proof of one, he may succeed in another. As in an action on the case upon an *ASSUMPSIT* for goods sold and delivered, the plaintiff usually counts or declares, first, upon a settled and agreed price between him and the defendant; as, that they bargained for 20 l.: and lest he should fail in the proof of this, he counts likewise upon a *quantum valebant*; that the defendant bought other goods, and agreed to pay him so much as they were reasonably worth: and then avers, that they were worth other 20 l. and so on in three or four different shapes; and at last concludes with declaring, that the defendant had refused to fulfil any of these agreements, whereby he is endamaged to such a value. And if he proves the case laid in any one of his counts, though he fails in the rest, he shall recover proportionable damages. This declaration always concludes with these words, "and thereupon he brings suit," &c. *inde producti sectam, &c.* By which words, *suit* or *secta*, (a *sequendo*), were anciently understood the witnesses or followers of the plaintiff. For in former times, the law would not put the defendant to the trouble of answering the charge till the plaintiff had made out at least a probable case. But the actual production of the *suit*, *secta*, or *followers*, is now antiquated, and hath been totally disused, at least ever since the reign of Edward III. though the form of it still continues.

At the end of the declaration are added also the plaintiff's common pledges of prosecution, John Doe and Richard Roe; which, as we elsewhere observed, (see *Writ*), are now mere names of form; though formerly they were of use to answer to the king for the amercement of the plaintiff, in case he were non-suited, barred of his action, or had a verdict and judgment against him. For if the plaintiff neglects to deliver a declaration for two terms after the defendant appears, or is guilty of other delays or defaults against the rules of law in any subsequent stage of the action, he is adjudged not to follow or pursue his remedy as he ought to do; and thereupon a *non-suit*, or *non-prosequitur*, is entered, and he is said to be *non-prosd.* And for thus deserting his complaint, after making a false claim or complaint, (*pro-falso clamore fact.*), he shall not only pay costs to the defendant, but is liable to be amerced to the king. A *retraxit* dif-

fers from a non-suit, in that the one is negative and the other positive: the non-suit is a default and neglect of the plaintiff, and therefore he is allowed to begin his suit again upon payment of costs; but a *retraxit* is an open and voluntary renunciation of his suit in court; and by this he for ever loses his action. A *dis-continuance* is somewhat similar to a non-suit; for when a plaintiff leaves a chasm in the proceedings of his cause, as by not continuing the process regularly from day to day, and time to time, as he ought to do, the suit is discontinued, and the defendant is no longer bound to attend; but the plaintiff must begin again, by suing out a new original, usually paying costs to his antagonist.

When the plaintiff hath stated his case in the declaration, it is incumbent on the defendant, within a reasonable time, to make his defence, and to put in a plea; or else the plaintiff will at once recover judgment by default, or *nihil dicit*, of the defendant.

Defence, in its true legal sense, signifies not a justification, protection, or guard, which is now its popular signification; but merely an *opposing* or *denial* (from the French verb *defendre*) of the truth or validity of the complaint. It is the *contestatio litis* of the civilians: a general assertion that the plaintiff hath no ground of action; which assertion is afterwards extended and maintained in his plea.

Before defence made, if at all, cognizance of the suit must be claimed or demanded; when any person or body-corporate hath the franchise, not only of holding pleas within a particular limited jurisdiction, but also of the cognizance of pleas; and that either without any words exclusive of other courts, which entitles the lord of the franchise, whenever any suit that belongs to his jurisdiction is commenced in the courts at Westminster, to demand the cognizance thereof; or with such exclusive words, which also entitle the defendant to plead to the jurisdiction of the court. Upon this claim of cognizance, if allowed, all proceedings shall cease in the superior court, and the plaintiff is left at liberty to pursue his remedy in the special jurisdiction. As, when a scholar or other privileged person of the universities of Oxford or Cambridge is impleaded in the courts at Westminster, for any cause of action whatsoever, unless upon a question of freehold. In these cases, by the charter of those learned bodies, confirmed by act of parliament, the chancellor, or vice-chancellor, may put in a claim of cognizance; which, if made in due time and form, and with due proof of the facts alleged, is regularly allowed by the courts. It must be demanded before all defence is made or imparity prayed; for these are a submission to the jurisdiction of the superior court, and the delay is a *laches* in the lord of the franchise: and it will not be allowed if it occasions a failure of justice, or if an action be brought against the person himself who claims the franchise, unless he hath also a power in such case of making another judge.

After defence made, the defendant must put in his plea. But before he defends, if the suit is commenced by *capias* or *latitat*, without any special original, he is entitled to demand *exc. imparlance*, or *licentia loquendi*; and may, before he pleads, have more granted by consent of the court, to see if he can end the matter amicably without farther suit, by talking with the

Pleadings.

the plaintiff: a practice which is supposed to have arisen from a principle of religion, in obedience to that precept of the gospel, "agree with thine adversary quickly, whilst thou art in the way with him." And it may be observed, that this gospel-precept has a plain reference to the Roman law of the twelve tables, which expressly directed the plaintiff and defendant to make up the matter, while they were in the way, or going to the prætor;—*in via, rem uti pacunt orato*. There are also many other previous steps which may be taken by a defendant before he puts in his plea. He may, in real actions, demand a view of the thing in question, in order to ascertain its identity and other circumstances. He may crave *oyer* of the writ, or of the bond, or other specialty upon which the action is brought; that is, to hear it read to him; the generality of defendants in the times of ancient simplicity being supposed incapable to read it themselves: whereupon the whole is entered *verbatim* upon the record; and the defendant may take advantage of any condition, or other part of it, not stated in the plaintiff's declaration. In real actions also the tenant may pray in *aid*, or call for assistance of another, to help him to plead, because of the feebleness or imbecility of his own estate. Thus a tenant for life may pray in aid of him that hath the inheritance in remainder or reversion; and an incumbent may pray in aid of the patron and ordinary; that is, that they shall be joined in the action, and help to defend the title. *Voucher* also is the calling in of some person to answer the action, that hath warranted the title to the tenant or defendant. This we still make use of in the form of common recoveries, which are grounded on a writ of entry; a species of action that relies chiefly on the weakness of the tenant's title, who therefore vouches another person to warrant it. If the vouchee appears, he is made defendant instead of the voucher; but if he afterwards makes default, recovery shall be had against the original defendant; and he shall recover an equivalent in value against the deficient vouchee. In assizes, indeed, where the principal question is, whether the demandant or his ancestors were or were not in possession till the ouster happened, and the title of the tenant is little (if at all) discussed, there no voucher is allowed; but the tenant may bring a writ of *warrantia chartæ* against the warrantor, to compel him to assist him with a good plea or defence, or else to render damages and the value of the land, if recovered against the tenant. In many real actions also, brought by or against an infant under the age of 21 years, and also in actions of debt brought against him, as heir to any deceased ancestor, either party may suggest the nonage of the infant, and pray that the proceedings may be deferred till his full age, or, in our legal phrase, that the infant may have his age, and that the *parol* may *demur*, that is, that the pleadings may be staid; and then they shall not proceed till his full age, unless it be apparent that he cannot be prejudiced thereby. But by the statutes of Westm. i. 3 Edw. i. c. 46. and of Gloucester, 6 Edw. i. c. 2. in writs of entry *sur disseisin* in some particular cases, and in actions unceitrel brought by an infant, the *parol* shall not *demur*; otherwise he might be deforced of his whole property: and even want a maintenance, till he came of age.

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So likewise in a writ of dower the heir shall not have his age; for it is necessary that the widow's claim be immediately determined, else she may want a present subsistence. Nor shall an infant patron have it in a *quare impedit*, since the law holds it necessary and expedient, that the church be immediately filled.

When these proceedings are over, the defendant must then put in his excuse or plea. See *PLEA*.

It is a rule in pleading, that no man be allowed to plead specially such a plea as amounts only to the general issue, or a total denial of the charge; but in such case he shall be driven to plead the general issue in terms, whereby the whole question is referred to a jury. But if the defendant, in an assize or action of trespass, be desirous to refer the validity of his title to the court rather than the jury, he may state his title specially, and at the same time give colour to the plaintiff, or suppose him to have an appearance or colour of title, bad indeed in point of law, but of which the jury are not competent judges. As if his own true title is, that he claims by feoffment with livery from A, by force of which he entered on the lands in question, he cannot plead this by itself, as it amounts to no more than the general issue, *nul tort, nul disseisin*, in assize, or *not guilty* in an action of trespass. But he may allege this specially, provided he goes farther, and says, that the plaintiff claiming by colour of a prior deed of feoffment, without livery, entered; upon whom he entered; and may then refer himself to the judgment of the court which of these two titles is the best in point of law.

When the plea of the defendant is thus put in, if it does not amount to an issue or total contradiction of the declaration, but only evades it, the plaintiff may plead again, and reply to the defendant's plea: Either traversing it, that is, totally denying it; as if, on an action of debt upon bond, the defendant pleads *solvit ad diem*, that he paid the money when due; here the plaintiff in his replication may totally traverse this plea, by denying that the defendant paid it: Or he may allege new matter in contradiction to the defendant's plea; as when the defendant pleads no award made, the plaintiff may reply, and set forth an actual award, and assign a breach: Or the replication may confess and avoid the plea, by some new matter or distinction, consistent with the plaintiff's former declaration; as in an action for trespassing upon land whereof the plaintiff is seized, if the defendant shews a title to the land by descent, and that therefore he had a right to enter, and gives colour to the plaintiff, the plaintiff may either traverse and totally deny the fact of the descent; or he may confess and avoid it, by replying, that true it is that such descent happened, but that since the descent the defendant himself demised the lands to the plaintiff for term of life. To the replication the defendant may *rejoin*, or put in an answer called a *rejoinder*. The plaintiff may answer the rejoinder by a *sur-rejoinder*; upon which the defendant may *rebut*, and the plaintiff answer him by a *sur-rebutter*. Which pleas, replications, rejoinders, sur-rejoinders, rebutters, and sur-rebutters answer to the *exceptio, replicatio, duplicatio, triplicatio*, and *quadruplicatio*, of the Roman laws.

The whole of this process is denominated the *pleading*; in the several stages of which it must be carefully ob-

ob-

Pleadings. observed, not to depart or vary from the title or defence which the party has once insisted on. For this (which is called a *departure* in pleading) might occasion endless altercation. Therefore the replication must support the declaration, and the rejoinder must support the plea, without departing out of it. As in the case of pleading no award made in consequence of a bond of arbitration, to which the plaintiff replies, setting forth an actual award; now the defendant cannot rejoin that he hath performed this award, for such rejoinder would be an entire departure for his original plea, which alleged that no such award was made: therefore he has now no other choice, but to traverse the fact of the replication, or else to demur upon the law of it.

Again, all duplicity in pleading must be avoided. Every plea must be simple, entire, connected, and confirmed to one single point: it must never be entangled with a variety of distinct independent answers to the same matter; which must require as many different replies, and introduce a multitude of issues upon one and the same dispute. For this would often embarrass the jury, and sometimes the court itself, and at all events would greatly enhance the expence of the parties. Yet it frequently is expedient to plead in such a manner as to avoid any implied admission of a fact, which cannot with propriety or safety be positively affirmed or denied. And this may be done by what is called a *protestation*; whereby the party interposes an oblique allegation or denial of some fact, protesting (by the gerund, *protestando*) that such a matter does or does not exist; and at the same time avoiding a direct affirmation or denial. Sir Edward Coke hath defined a protestation (in the pithy dialect of that age) to be "an exclusion of a conclusion." For the use of it is, to save the party from being concluded with respect to some fact or circumstance which cannot be directly affirmed or denied without falling into duplicity of pleading; and which yet, if he did not thus enter his protest, he might be deemed to have tacitly waved or admitted. Thus, while tenure in villenage subsisted, if a villein had brought an action against his lord, and the lord was inclined to try the merits of the demand, and at the same time to prevent any conclusion against himself that he had waived his signiory; he could not in this case both plead affirmatively that the plaintiff was his villein, and also take issue upon the demand; for then his plea would have been double, as the former alone would have been a good bar to the action: but he might have alleged the villenage of the plaintiff by way of protestation, and then have denied the demand. By this means the future vassalage of the plaintiff was saved to the defendant, in case the issue was found in his (the defendant's) favour; for the protestation prevented that conclusion which would otherwise have resulted from the rest of his defence, that he had enfranchised the plaintiff, since no villein could maintain a civil action against his lord. So also if a defendant, by way of inducement to the point of his defence, alleges (among other matters) a particular mode of seisin or tenure which the plaintiff is unwilling to admit, and yet desires to take issue on the principal point of the defence, he must deny the seisin or tenure by way of protestation, and then traverse the defensive matter. So, lastly, if an award be set forth by the plaintiff, and he can assign a breach in one part of it (*viz.* the

non-payment of a sum of money) and yet is afraid to *Pleadings.* admit the performance of the rest of the award, or to aver in general a non-performance of any part of it, lest something should appear to have been performed; he may save to himself any advantage he might hereafter make of the general non-performance, by alleging that by protestation, and plead only the non-payment of the money.

In any stage of the pleadings, when either side advances or affirms any new matter, he usually (as was said) avers it to be true; "and this he is ready to verify." On the other hand, when either side traverses or denies the facts pleaded by his antagonist, he usually tenders an *issue*, as it is called; the language of which is different according to the party by whom it is tendered: for if the traverse or denial comes from the defendant, the issue is tendered in this manner, "And of this he puts himself upon the country," thereby submitting himself to the judgment of his peers: but if the traverse lies upon the plaintiff, he tenders the issue or prays the judgment of the peers against the defendant in another form; thus, "And this he prays may be inquired of by the country."

But if either side (as, for instance, the defendant) pleads a special negative plea, not traversing or denying any thing that was before alleged, but disclosing some new negative matter; as where the suit is on a bond conditioned to perform an award, and the defendant pleads, negatively, that no award was made; he tenders no issue upon this plea, because it does not yet appear whether the fact will be disputed, the plaintiff not having yet asserted the existence of any award: but when the plaintiff replies, and sets forth an actual specific award, if then the defendant traverses the replication, and denies the making of any such award, he then, and not before, tenders an issue to the plaintiff. For when, in the course of pleading, they come to a point which is affirmed on one side and denied on the other, they are then said to be at issue; all their debates being at last contracted into a single point, which must now be determined either in favour of the plaintiff or of the defendant. See the article *ISSUE*, in the APPENDIX.

PLEASURE and PAIN, says Mr Locke, are simple ideas which we receive both from sensation and reflection; these being thoughts of the mind, as well as sensations accompanied with pleasure and pain. See *METAPHYSICS*, n^o 71, 72.

PLEBEIAN, any person of the rank of the common people. It is chiefly used in speaking of the ancient Romans, who were divided into senators, patricians, and plebeians. The distinction was made by Romulus the founder of the city; who confined all dignities, civil, military, and sacerdotal, to the rank of patricians. But, to prevent the seditions which such a distinction might produce through the pride of the higher order and the envy of the lower, he endeavoured to engage them to one another by reciprocal ties and obligations. Every plebeian was allowed to choose, out of the body of the patricians, a protector, who should be obliged to assist him with his interest and subsistance, and to defend him from oppression. These protectors were called *patrons*; the protected, *clients*. It was the duty of the patron to draw up the contracts of the clients, to extricate them out of their difficulties

Pledge || **Plentitude.** culties and perplexities, and to guard their ignorance against the artfulness of the crafty. On the other hand, if the patron was poor, his clients were obliged to contribute to the portions of his daughters, the payment of his debts, and the ransom of him and his children if they happened to be taken in war. The client and patron could neither accuse, nor bear witness against each other; and if either of them was convicted of having violated this law, the crime was equal to that of treason, and any one might with impunity slay the offender as a victim devoted to Pluto and the infernal gods. For more than 600 years, we find no dissensions nor jealousies between the patrons and their clients; not even in the times of the republic, when the people frequently mutinied against the great and powerful.

PLEDGE, (*Plegius*), in common law, a surety, or gage, either real or personal, which the plaintiff or defendant is to find for his prosecuting the suit.

The word is sometimes also used for **FRANK Pledge**, which see.

To **PLEDGE**, in drinking, denotes to warrant, or be surety to one, that he shall receive no harm while he is taking his draught.—The phrase is referred by our antiquaries, to the practice of the Danes, heretofore in England, who frequently used to stab, or cut the throats of the natives, while they were drinking.

PLEDGERY, or **PLEGGERY**, in law, suretiship, or an undertaking or answering for another.

PLEDGES of Goods for money. See **PAWN**, in the **APPENDIX**.

PLEDGET, **BOLSTER**, or *Compress*, in surgery, a kind of flat tent laid over a wound, to imbibed the superfluous humours, and to keep it clean.

PLEIADES, in fabulous history, the seven daughters of Atlas king of Mauritania, and Pleione, were thus called from their mother. They were Maia, Electra, Taygete, Alceope, Merope, Halcyone, and Celeno: and were also called *Atlantides*, from their father Atlas. These princesses were carried off by Buriis, king of Egypt; but Hercules having conquered him, delivered them to their father: yet they afterwards suffered a new persecution from Orion, who pursued them five years, till Jove, being prevailed on by their prayers, took them up into the heavens, where they form the constellation which bears their name.

PLEIADES, in astronomy, an assemblage of seven stars, in the neck of the constellation Taurus.

They are thus called from the Greek *πλῆν, ναυγάρε*, "to sail;" as being terrible to mariners, by reason of the rains and storms that frequently rise with them. The Latins called them *vergiliae*, from *ver*, "spring;" because of their rising about the time of the vernal equinox. The largest is of the third magnitude, and is called *lucide pleiadum*.

PLENARY, something complete or full. Thus we say the pope grants *plenary* indulgences; i. e. full and entire remissions of the penalties due to all sins. See **INDULGENCE**.

PLENIPOTENTIARY, a person vested with full power to do any thing. See **AMBASSADOR**.

PLENITUDE, the quality of a thing that is full, or that fills another. In medicine, it chiefly denotes a redundancy of blood and humours.

PLENUM, in physics, denotes, according to the Cartesians, that state of things wherein every part of space is supposed to be full of matter, in opposition to a **VACUUM**.

PLENUS FLOS, a full flower; a term expressive of the highest degree of luxuriance in flowers. The petals in full flowers are so multiplied as to exclude all the stamina, and frequently to choke up the female organ; so that such flowers, although the most delightful to the eye, are both vegetable monsters, and, according to the sexualists, vegetable eunuchs; the unnatural increase of the petals constituting the first; the consequent exclusion of the stamina or male organs, the latter.

Flowers with more petals than one, are most liable to this, as well as the inferior degrees of luxuriance. The following are well known examples; ranunculus, anemone, marsh-marygold, columbine, fennel-flower, poppy, pæony, pink, gillflower, campion, viscous campion, lily, crown imperial, tulip, narcissus, rocket, mallow, Syrian mallow, apple, pear, peach, cherry, almond, myrtle, rose, and strawberry.

Flowers with one petal, are more rarely subject to fullness; that they are not, however, totally exempted, appears from polianthus, hyacinth, primrose, crocus, meadow-saffron, and thorn-apple, tho' Kramer has asserted that a full flower with one petal is a contradiction in terms.

In flowers with one petal, the mode of luxuriance, or impletion, is by a multiplication of the divisions of the limb or upper part; in flowers with more petals than one, by a multiplication of the petals or nectarium.

To take a few examples. Columbine is rendered full in three different ways: 1. By the multiplication of its petals, and total exclusion of the nectaria; 2. By the multiplication of the nectaria, and exclusion of the petals; or, 3. By such an increase of the nectaria only as does not exclude the petals, between each of which are interjected three nectaria, placed one within another. Again, fennel-flower is rendered full, by an increase of the nectaria only; narcissus, either by a multiplication of its cup and petals, or of its cup only; larkspur, commonly by an increase of the petals, and exclusion of the spur, which is its nectarium. In *saponaria concava anglica*, the impletion is attended with the singular effect of incorporating the petals, and reducing their number from five to one; and in gelder rose, the luxuriance is effected by an increase both in magnitude and number of the plains, wheel-shaped, barren florets of the circumference or margin of the head of flowers; and an exclusion of all the bell-shaped hermaphrodite florets of the centre or disk.

Hitherto we have treated of plenitude in simple flowers only: the instance just now adduced seems to connect the different modes of impletion in them and compound flowers. Before proceeding further, however, it will not be improper to premise, that as a simple luxuriant flower is frequently, by beginners, mistaken for a compound flower in a natural state, such flowers may always be distinguished with certainty by this rule: That in simple flowers, however luxuriant, there is but one *pistillum*, or female organ; whereas in compound flowers, each floret, or partial flower, is furnished

Pleuris. nished with its own proper *pistillum*. Thus in hawkweed, a compound flower, each flat or tongue-shaped floret in the aggregate has its five stamina and naked seed; which last is, in effect, its *pistillum*; whereas, in a luxuriant *lychnis*, which is a simple flower, there is found only one *pistillum*, or female organ, common to the whole.

In a compound radiated flower, which generally consists of plain florets in the margin or radius, and tubular or hollow florets in the centre or disc; plenitude is effected either by an increase of the florets in the margin, and a total exclusion of those in the disc; which mode of luxuriance is termed *impletion* by the *radius*, and resembles what happens in the gelder-rose: or by an elongation of the hollow florets in the centre, and a less profound division of their brims; which is termed *impletion* by the *disc*. In the first mode of luxuriance, the florets in the centre, which are always hermaphrodite or male, are entirely excluded; and in their place succeed florets similar in sex to those of the radius. Now, as the florets in the margin of a radiated compound flower, are found to be always either female; that is, furnished with the *pistillum* only; or neuter, that is, furnished with neither stamina nor *pistillum*; it is evident, that a radiated compound flower, filled by the radius, will either be entirely female, as in feverfew, daisy, and African *marygold*; or entirely neuter, as in sun-flower, *marygold*, and centaury: hence it will always be easy to distinguish such a luxuriant flower from a compound flower with plain florets in a natural state; as these florets are all hermaphrodite; that is, furnished with both stamina and *pistillum*. Thus the full flowers of African *marygold* have each floret furnished with the *pistillum* or female organ only: the natural flowers of dandelion, which, like the former, is composed of plain florets, are furnished with both stamina and *pistillum*.

In the second mode of luxuriance, termed *impletion* by the *disc*, the florets in the margin sometimes remain unchanged; but most commonly adopt the figure of those in the centre, without, however, suffering any alteration in point of sex; so that confusion is less to be apprehended from this mode of luxuriance than from the former; besides, the length to which the florets in the centre run out is of itself a sufficient distinction, and adapted to excite at once an idea of luxuriance. Daisy, feverfew, and African *marygold*, exhibit instances of this as well as of the former mode of impletion.

In luxuriant compound flowers with plain florets, the *semistylis* of Tournefort, the stigma or summit of the style in each floret is lengthened, and the seed-buds are enlarged and diverge; by which characters such flowers may always be distinguished from flowers of the same kind in a natural state. *Scorzonera*, *nipplewort*, and goat's-beard, furnish frequent instances of the plenitude alluded to.

Lastly, the impletion of compound flowers with tubular or hollow florets, the *stylis* of Tournefort, seems to observe the same rules as that of radiated flowers just delivered. In everlasting-flower, the *seranthemum* of Linnaeus, the impletion is singular, being effected by the enlargement and expansion of the inward chafy scales of the calix. These scales, which become coloured, are greatly augmented in length, so

as to overtop the florets, which are scarce larger than those of the same flower in a natural state. The florets too in the margin, which in the natural flower are female, become, by luxuriance, barren; that is, are deprived of the *pistillum*; the style, which was very short, spreads, and is of the length of the chafy scales; and its summits, formerly two in number, are metamorphosed into one.

Full flowers are more easily referred to their respective genera in methods founded upon the calix, as the flower-cup generally remains unaffected by this highest degree of luxuriance.

PLEONASM, a figure in rhetoric, whereby we use words seemingly superfluous, in order to express a thought with the greater energy; such as, "I saw it with my own eyes," &c. See ORATORY, n° 64.

PLETHORA, in medicine, from *πλεθος*, "plenitude." A plethora is when the vessels are too much loaded with fluids. The plethora may be sanguine or ferous. In the first there is too much crassamentum in the blood, in the latter too little. In a sanguine plethora there is danger of a fever, inflammation, apoplexy, rupture of the blood-vessels, obstruited secretions, &c.: In a ferous, a dropsy, &c. A rarefaction of the blood produces all the effects of a plethora; it may accompany a plethora, and should be distinguished therefrom. Mr Bromfield observes, that a sanguine plethora may thus be known to be present by the pulse. An artery overcharged with blood is as incapable of producing a strong full pulse, as one that contains a deficient quantity; in both cases, there will be a low and weak pulse. To distinguish rightly, the pulse must not be felt with one or two fingers on the carpal artery; but if three or four fingers cover a considerable length of the artery, and we press hard for some time on it, and then suddenly raise all these fingers except that which is nearest to the patient's hand, the influx of the blood, if there is a plethora, will be so rapid as to raise the other finger, and make us sensible of the fulness. The sanguine plethora is relieved by bleeding; the ferous by purging, diuretics, and sweating.

PLEURA, in anatomy, a thin membrane covering the inside of the thorax. See ANATOMY, n° 377.

PLEURONECTES, in ichthyology, a genus belonging to the order of thoracici. Both eyes are on the same side of the head; there are from four to five rays in the gill-membrane; the body is compressed; the one side resembling the back, the other the belly. There are 17 species; the most remarkable are,

1. The hippoglossus, or holibut. This is the largest of the genus: some have been taken in our seas weighing from 100 to 300 pounds; but much larger are found in those of Newfoundland, Greenland, and Iceland, where they are taken with a hook and line in very deep water. They are part of the food of the Greenlanders, who cut them into large slips, and dry them in the sun. They are common in the London markets, where they are exposed to sale cut into large pieces. They are very coarse eating, excepting the part which adheres to the side-fins, which is extremely fat and delicious, but surfeiting. They are the most voracious of all flat fish. There have been instances of their swallowing the lead weight at the end of a line, with which the fishermen were sounding the bottom

Pleonasm
Pleuronectes.

Pleuronectes. tom from on board a ship. The holibut, in respect to its length, is the narrowest of any of this genus except the sole. It is perfectly smooth, and free from spines either above or below. The colour of the upper part is dusky; beneath, of a pure white. We do not count the rays of the fins in this genus; not only because they are so numerous, but because nature hath given to each species characters sufficient to distinguish them by. These flat fish swim sideways; for which reason Linnæus hath styled them *pleuronectes*.

2. The plaice, or plaice, are very common on most of our coasts, and sometimes taken of the weight of 15 pounds; but they seldom reach that size, one of eight or nine pounds being reckoned a large fish. The best and largest are taken off Rye on the coast of Sussex, and also off the Dutch coasts. They spawn in the beginning of February. They are very flat, and much more square than the preceding. Behind the left eye is a row of six tubercles, that reaches to the commencement of the lateral line. The upper part of the body and fins is of a clear brown, marked with large bright orange-coloured spots: the belly is white.

3. The flæsus, or flounder, inhabits every part of of the British sea, and even frequents our rivers at a great distance from the salt waters; and for this reason some writers call it the *passer fluviatilis*. It never grows large in our rivers, but is reckoned sweeter than those that live in the sea. It is inferior in size to the plaice, seldom or never weighing more than six pounds. It may very easily be distinguished from the plaice, or any other fish of this genus, by a row of sharp small spines that surround its upper sides, and are placed just at the junction of the fins with the body. Another row marks the side-line, and runs half way down the back. The colour of the upper part of the body is a pale brown, sometimes marked with a few obscure spots of dirty yellow: the belly is white.

4. The limanda, or dab, is found with the other species, but is less common. It is in best season during February, March, and April: they spawn in May and June, and become flabby and watery the rest of summer. They are superior in goodness to the plaice and flounder, but far inferior in size. It is generally of an uniform brown colour on the upper side, though sometimes clouded with a darker. The scales are small and rough, which is a character of this species. The lateral line is extremely incurvated at the beginning, then goes quite straight to the tail. The lower part of the body is white.

5. The solea, or sole, is found on all our coasts; but those on the western shores are much superior in size to those of the north. On the former they are sometimes taken of the weight of six or seven pounds, but towards Scarborough they rarely exceed one pound; if they reach two, it is extremely uncommon. They are usually taken in the trawl-net: they keep much at the bottom, and feed on small shell-fish. It is of a form much more narrow and oblong than any other of the genus. The irides are yellow; the pupils of a bright sapphire colour: the scales are small, and very rough: the upper part of the body is of a deep brown; the tip of one of the pectoral fins, black; the under part of the body, white: the lateral line is straight; the tail rounded at the end. It is a fish of a

very delicate flavour; but the small soles are much superior in goodness to large ones. By the ancient laws of the Cinque Ports, no one was to take soles from the 1st of November to the 15th of March; neither was any body to fish from sun-setting to sun-rising, that the fish might enjoy their night-food. The chief fishery for them is at Brixham in Torbay.

6. The maximus, or turbot, grows to a very large size; Mr Pennant has seen them of 23 pounds weight, but has heard of some that weighed 30. They are taken chiefly off the north coast of England, and others off the Dutch coast.

The large turbot, and several other kinds of flat fish, are taken by the hook and line, for they lie in deep water: the method of taking them in wares, or flaked nets, is too precarious to be depended on for the supply of our great markets, because it is by mere accident that the great fish stray into them. The following is the method of fishing for turbot followed at Scarborough: When they go out to fish, each person is provided with three lines. Each man's lines are fairly coiled upon a flat oblong piece of wicker-work; the hooks being baited, and placed very regularly in the centre of the coil. Each line is furnished with 14 score of hooks, at the distance of six feet two inches from each other. The hooks are fastened to the lines upon heads of twisted horse-hair, 27 inches in length. When fishing, there are always three men in each coble; and consequently nine of these lines are fastened together, and used as one line, extending in length near three miles, and furnished with 2520 hooks. An anchor and a buoy are fixed at the first end of the line, and one more of each at the end of each man's lines; in all four anchors, which are commonly perforated stones, and four buoys made of leather or cork. The line is always laid across the current. The tides of flood and ebb continue an equal time upon our coast; and, when undisturbed by winds, run each way about six hours. They are so rapid, that the fishermen can only shoot and haul their lines at the turn of tide; and therefore the lines always remain upon the ground about six hours. The same rapidity of tide prevents their using hand-lines; and therefore two of the people commonly wrap themselves in the sail, and sleep, while the other keeps a strict look-out, for fear of being run down by ships, and to observe the weather. For storms often rise so suddenly, that it is with extreme difficulty they can sometimes escape to the shore, leaving their lines behind. The coble is 20 feet 6 inches long, and 5 feet extreme breadth. It is about one ton burden, rowed with three pair of oars, and admirably constructed for the purpose of encountering a mountainous sea: they hoist sail when the wind suits. The five-men boat is 40 feet long and 15 broad, and of 25 tons burden; it is so called, though navigated by six men and a boy, because one of the men is commonly hired to cook, &c. and does not share in the profits with the other five. All our able fishermen go in these boats to the herring-fishery at Yarmouth the latter end of September, and return about the middle of November. The boats are then laid up until the beginning of Lent; at which time they go off in them to the edge of the Dogger, and other places, to fish for turbot, cod, ling, flæsus, &c. They always take two cobles on board; and when they come upon their

Pleuronectes
Plica.

ground, anchor the boat, throw out the cobbles, and fish in the same manner as those do who go from the shore in a coble; with this difference only, that here each man is provided with double the quantity of lines, and instead of waiting the return of tide in the coble, return to the boat and bait their other lines; thus hawling one fet, and shooting another every turn of tide. They commonly run into harbour twice a-week to deliver their fish. The five-men boat is decked at each end, but open in the middle, and has two large lug-sails. The best bait for all kinds of fish is fresh herring cut in pieces of a proper size; and notwithstanding what has been said to the contrary, they are taken here at any time in the winter, and all the spring, whenever the fishermen put down their nets for that purpose. The five-men boats always take some nets for that end. Next to herrings are the lesser lampreys, which come all winter by land-carriage from Tadcaster. The Dutch also use these fish as baits in the turbot fishery, and purchase annually from the Thames fishermen as much as amounts to 700*l.* worth for that purpose. The next baits in esteem are small haddocks cut in pieces, sand-worms, muscles, and limpets (called here *sidders*); and, lastly, when none of these can be had, they use bullock's liver. The hooks used here are much smaller than those employed at Iceland and Newfoundland. Experience has shewn, that the larger fish will take a living small one upon the hook, sooner than any bait that can be put on; therefore they use such as the small fish can swallow. The hooks are two inches and an half long in the shank, and near an inch wide between the shank and the point. The line is made of small cording, and is always tanned before it is used.

Turbots, and all the rays, are extremely delicate in their choice of baits. If a piece of herring or haddock has been 12 hours out of the sea, and then used as bait, they will not touch it. This species is of a remarkable square form: the colour of the upper part of the body is cinereous, marked with numbers of black spots of different sizes; the belly is white; the skin is without scales, but greatly wrinkled, and mixed with small short spines, dispersed without any order.

PLEXUS, among anatomists, a bundle of small vessels interwoven in the form of net-work: thus a congeries of vessels within the brain is called *plexus choroides, reticularis, or retiformis*. See ANATOMY, n^o 397, c.

A plexus of nerves is an union of two or more nerves, forming a sort of ganglion or knot.

PLICA POLONICA, in medicine, a disease of the hair, almost peculiar to Poland and Lithuania; and hence denominated *polonica*. It consists of a preternatural bulk of the hair, which being firmly conglutinated and wrapped up in inextricable knots, and extended to a monstrous length, affords a very unfeemly spectacle. When these are cut off, the blood is discharged from them, the head racked with pain, the sight impaired, and the patient's life frequently endangered.

This disorder is supposed to arise from the fardid and nasty manner of life to which these people are addicted, and from an hereditary fault conveyed from the parents, which consists in too great a bulk of the pores and bulbous hairs under the skin of the head:

hence the thick and glutinous nutritious juice, produced by their coarse aliments and impure waters, is by heat forced into the cavities of the hairs, and sweating through their pores, produces this terrible disease.

A perfect method of curing this disorder is unknown; undoubtedly because, in those parts of Poland in which this disease is endemial, there have been few physicians who, from what is commonly known of the nature and cure of the plica polonica, have been able to lay down a rational and judicious plan for treating it. It is certain, that purging and venesection are so far from being beneficial in this disorder, that they often prove hurtful, by throwing the peccant humours into violent commotions, and more effectually distributing them through the whole body. It is therefore most safe and expedient to solicit the peccant matter to the hairs, to which it naturally tends: and this intention, Senertus says, is most effectually answered by lotions of bear's-breech.

PLINTH, ORLE, or ORLO, in architecture, a flat square member, in the form of a brick. It is used as the foundation of columns, being that flat square table under the moulding of the base and pedestal at the bottom of the whole order. It seems to have been originally intended to keep the bottom of the original wooden pillars from rotting. Vitruvius also calls the tufcan abacus *plinth*.

PLINTH of a Statue, &c. is a base, either flat, round, or square, that serves to support it.

PLINTH of a Wall, denotes two or three rows of bricks advancing out from a wall; or, in general, any flat high moulding, that serves in a front-wall to mark the floors, to sustain the eaves of a wall, or the larmier of a chimney.

PLINY the ELDER, or *Cæcilius Plinius Secundus*, one of the most learned men of ancient Rome, was descended from an illustrious family, and born at Verona. He bore arms in a distinguished post; was one of the college of Augurs; became intendant of Spain; and was employed in several important affairs by Vespasian and Titus, who honoured him with their esteem. The eruption of Mount Vesuvius, which happened in the year 79, proved fatal to him. His nephew, Pliny the Younger, relates the circumstances of that dreadful eruption, and the death of his uncles, in a letter to Tacitus. Pliny the Elder wrote a Natural History in 37 books, which is still extant, and has had many editions; the most esteemed of which is that of Father Hardouin, printed at Paris in 1723, in two volumes folio.

PLINY, the Younger, nephew of the former, was born in the ninth year of Nero, and the 62d of Christ, at Novocomum, a town upon the lake Larius, near which he had several beautiful villas. Cæcilius was the name of his father, and Plinius Secundus that of his mother's brother, who adopted him. He brought into the world with him fine parts and an elegant taste, which he did not fail to cultivate early; for, as he tells us himself, he wrote a Greek tragedy at 14 years of age. He lost his father when he was young; and had the famous Virginius for his tutor or guardian, whom he has set in a glorious light. He frequented the schools of the rhetoricians, and heard Quintilian; for whom he ever after entertained so high an esteem, that he bestowed a considerable portion upon

Plinth,
Pliny.

Pliny.

upon his daughter at her marriage. He was in his 18th year when his uncle died; and it was then that he began to plead in the forum, which was the usual road to dignities. About a year after, he assumed the military character, and went into Syria with the commission of tribune: but this did not suit his taste any more than it had done Tully's; and therefore we find him returning after a campaign or two. He tells us, that in his passage homewards he was detained by contrary winds at the island Icaria, and how he employed himself in making verses: he enlarges in the same place upon his poetical exertations; yet poetry was not the shining part of his character, any more than it had been of Tully's.

Upon his return from Syria, he married a wife, and settled at Rome: it was in the reign of Domitian. During this most perilous time, he continued to plead in the forum, where he was distinguished not more by his uncommon abilities and eloquence, than by his great resolution and courage, which enabled him to speak boldly, when none else durst scarcely speak at all. On these accounts he was often singled out by the senate, to defend the plundered provinces against their oppressive governors, and to manage other causes of a like important and dangerous nature. One of these was for the province of Bœtica, in their prosecution of Bæbius Massa; in which he acquired so general an applause, that the emperor Nerva, then a private man, and in banishment at Tarentum, wrote him a letter, in which he congratulated not only Pliny, but the age which had produced an example so much in the spirit of the ancients. Pliny relates this affair in a letter to Cornelius Tacitus; and he was so pleased with it himself, that he could not help intrusting this friend to record it in his history. He intrusts him, however, with infinitely more modesty than Tully had intrusted Luceius upon the same occasion: and though he might imitate Cicero in the request, as he professes to have constantly set that great man before him for a model, yet he took care not to transgress the bounds of decency in his manner of making it. He obtained the offices of questor and tribune, and luckily went unhurt through the reign of Domitian: there is, however, reason to suppose, if that emperor had not died just as he did, that Pliny would have shared the fate of many other great men; for he tells us himself, that his name was afterwards found in Domitian's tablets, among the number of those who were destined to destruction.

He lost his wife in the beginning of Nerva's reign, and soon after took his beloved Calpurnia, of whom we read so much in his Epistles. He had not however any children by any of his wives: and hence we find him thanking Trajan for the *jus trium liberorum*, which he afterwards obtained of that emperor for his friend Suetonius Tranquillus. He hints also, in his letter of thanks to Trajan, that he had been twice married in the reign of Domitian. He was promoted to the consulate by Trajan in the year 100, when he was 38 years of age; and in this office pronounced that famous panegyric, which has ever since been admired, as well for the copiousness of the topics, as the elegance of address. Then he was elected augur, and afterwards made proconsul of Bithynia, from whence he wrote to Trajan that curious letter concerning the primitive

Christians; which, with Trajan's rescript, is happily extant among his Epistles. Pliny's letter, as Mr Melmoth observes in a note upon the passage, is esteemed as almost the only genuine monument of ecclesiastical antiquity relating to the times immediately succeeding the apostles, it being written at most not above 40 years after the death of St Paul. It was preferred by the Christians themselves, as a clear and unsuspicious evidence of the purity of their doctrines; and is frequently appealed to by the early writers of the church against the calumnies of their adversaries. It is not known what became of Pliny after his return from Bithynia; whether he lived at Rome, or what time he spent at his country-houses. Antiquity is also silent as to the time of his death: but it is conjectured that he died either a little before or soon after that excellent prince, his admired Trajan; that is, about the year of Christ 116.

Pliny was one of the greatest wits, and one of the worthiest men, among the ancients. He had fine parts, which he cultivated to the utmost; and he accomplished himself with all the various kinds of knowledge which could serve to make him either useful or agreeable. He wrote and published a great number of things; but nothing has escaped the wreck of time, except the books of Letters, and the panegyric upon Trajan. This has ever been considered as a masterpiece: and if he has, as some think, almost exhausted all the ideas of perfection in a prince, and gone perhaps a little beyond the truth, yet it is allowed that no panegyrist was ever possessed of a finer subject, and on which he might better indulge in all the flow of eloquence, without incurring the suspicion of flattery and lies. His letters seem to have been intended for the public; and in them he may be considered as writing his own memoirs. Every epistle is a kind of historical sketch, wherein we have a view of him in some striking attitude, either of active or contemplative life. In them are preserved anecdotes of many eminent persons, whose works are come down to us, as Suetonius, Silius Italicus, Martial, Tacitus, and Quintilian; and of curious things, which throw great light upon the history of those times. They are written with great politeness and spirit; and if they abound too much in turn and metaphor, we must impute it to that degeneracy of taste which was then accompanying the degenerate manners of Rome. Pliny however seems to have preserved himself in this latter respect from the general contagion: whatever the manners of the Romans were, his were pure and incorrupt. His writings breathe a spirit of transcendent goodness and humanity: his only imperfection is, he was too desirous that the public and posterity should know how humane and good he was. We have two elegant English translations of his Epistles; the one by Mr Melmoth, and the other by Lord Orrery.

PLOCE. See ORATORY, n° 67.

PLOT (Dr Robert), a learned antiquarian and philosopher, was born at Sutton-barn, in the parish of Borden in Kent, in the year 1641, and studied in Magdalen-hall, and afterwards in university-college, Oxford. In 1682 he was elected secretary of the Royal Society, and published the Philosophical Transactions from N° 143 to N° 166 inclusive. The next year Elias Ashmole, Esq; appointed him first keeper of his Museum,

Pliny
Plot.

Plot,
Plotinus.

feum, and about the same time the vice-chancellor nominated him first professor of chemistry in that university. In 1687 he was made secretary to the Earl Marshall, and the following year received the title of *historiographer* to King James II. In 1690 he resigned his professorship of chemistry, and likewise his place of keeper of the museum, to which he presented a very large collection of natural curiosities; which were those he had described in his histories of Oxfordshire and Staffordshire: the former published at Oxford in 1677, folio, and reprinted with additions and corrections in 1705; and the latter was printed in the same size in 1686. In January 1694-5, Henry Howard, Earl Marshall, nominated him Mobrai-herald extraordinary; two days after which he was constituted register of the court of honour; and, on the 30th of April 1696, he died of the stone at his house in Borden.

As Dr Plot delighted in natural history, the above works were designed as essays towards a Natural History of England; and he had actually formed a design of travelling through England and Wales for that purpose. He accordingly drew up a plan of his scheme in a letter to the learned Bishop Fell; which is inserted at the end of the second volume of Leland's Itinerary, of the edition of 1744. Besides the above works, he published *De origine fontium tentamen philosophicum*, 8vo. and nine papers in the Philosophical Transactions.

Plot, in dramatic poetry, is sometimes used for the fable of a tragedy or comedy; but more particularly the knot or intrigue, which makes the *embarras* of any piece. See POETRY.

Plot, in surveying, the plan or draught of any field, farm, or manor, surveyed with an instrument, and laid down in the proper figure and dimensions.

PLOTINUS, a Platonic philosopher in the third century. His genius was greatly superior to the vulgar herd of philosophers, and was very singular and extraordinary. At 28 years of age he had a strong desire to study philosophy, on which occasion he was recommended to the most famous professors of Alexandria. He was not satisfied with their lectures; but, upon hearing those of Ammonius, he confessed that this was the man he wanted. He studied for 11 years under that excellent master, and then went to hear the Persian and Indian philosophers. He afterwards read lectures of philosophy at Rome; and in the 50th year of his age, Porphyry became his disciple. Porphyry being resolved to have every thing fully explained, Plotinus, to give him that satisfaction, was induced to write many books; 24 of which he composed during the six years that Porphyry was his disciple; and these, added to 21 that he had written before Porphyry's arrival, with nine he composed after Porphyry's leaving Rome, made in all 54 books, which are divided into six Enneades, and are all upon very abstruse subjects. However, we may discover in them the traces of a fruitful, elevated, vast, and penetrating genius, and a close method of reasoning. The Romans had a high veneration for him; and he passed for a man of such judgment and virtue, that many persons of both sexes, when they found themselves dying, intrusted him, as a kind of guardian angel, with the care of their estates and children. He was the arbiter of numberless law-suits; and constantly behaved with such

humanity and rectitude of mind, that he did not create himself one enemy during the 26 years he resided in Rome. He, however, did not meet with the same justice from all of his own profession; for a philosopher of Alexandria, being envious of his glory, used his utmost endeavours, though in vain, to ruin him. The emperor Gallienus, and the empress Salonina, had a very high regard for him; and, had it not been for the opposition of some jealous courtiers, they would have had the city of Campania rebuilt, and given to him with the territory belonging to it, to establish a colony of philosophers, and to have it governed by the ideal laws of Plato's commonwealth. He laboured under various disorders during the last year of his life, which obliged him to leave Rome, when he was carried to Campania to the heirs of one of his friends, who furnished him with every thing necessary; and there he died in the year 270, aged 66. His 54 books are printed in Greek, with a Latin version, contents, and an analysis of each book, by Marcellus Ficinus. His life was written by Porphyry, the most illustrious of his disciples.

PLOUGH, in agriculture, a machine for turning up the soil, contrived to save the time, labour, and expences, that, without this instrument, must have been employed in digging land, to prepare for the sowing of all kinds of grain. See AGRICULTURE, n° 77, &c.

PLOUGHMAN, the person who guides the plough in the operation of tilling.

PLOUGHING, in agriculture, the turning up the earth with a plough. See AGRICULTURE, Part II. *passim*.

PLOVER, in ornithology, a species of CHARADRIUS.

These birds usually fly in exceedingly large flocks in the places they frequent; people talk of 20,000 or 30,000 being seen in a flock. They generally come to us in September, and leave us about the end of March. In cold weather they are found very commonly on lands lying near the sea, in quest of food; but in thaws and open seasons, they go higher up in the country.

They love to feed on ploughed lands, but never remain long at a time on them, for they are very cleanly in their nature; and the dirt which lodges on their beaks and feet, give them so much uneasiness, that they fly to the nearest water to wash themselves. When they roost, they do not go to trees or hedges; but sit squatting on the ground like ducks or geese, far from trees or hedges, when the weather is calm; but when it is stormy, they often get under shelter. In wet weather they do not sleep in the night at all, but run about picking up the worms as they crawl out of the ground; during this feeding they are continually making a small cry, that serves to keep them together, and in the morning they take flight. If in their flight they spy any others on the ground, they call them up; and if they refuse to come, the whole body descends to see what food there is in the place that detains them.

Plovers are very easily taken at the time of their first coming over, when they have not got any other birds mixed among them; but when they afterwards pick up the teal and other shy birds among them, it becomes more difficult. The best season for taking them is in October; especially in the beginning of that month: after this they grow timorous, and are not easily

Plough
||
Plover.

Plowden.
Plumbery.

safely taken again till March, which is the time of their coupling. The severest frosts are not the best season for taking them in nest, but variable weather does better. The north-west wind is found disadvantageous to the taking of them; and in general, great regard is to be paid to the course of the wind in the setting of the nets. All sea-fowl fly against the wind when the land lies that way; and the nets for taking them are therefore to be placed in a proper direction accordingly.

PLOWDEN (Edmund), serjeant at law, was the son of Humphrey Plowden, of Plowden in Shropshire, of an ancient and genteel family. He was first a student of the university of Cambridge, where he spent three years in the study of philosophy and medicine. He then removed to Oxford, where, having continued his former studies about four years more, in 1552 he was admitted to the practice of physic and surgery: but probably finding the practice of the art of healing less agreeable than the study, he entered himself of the Middle Temple, and began to read law. Wood says, that in 1557 he was summer-reader to that society, and Lent-reader three years after, being then serjeant, and oracle of the law. He died in the year 1584, aged 67; and was buried in the Temple church, near the north wall, at the east end of the choir. He married the daughter of William Sheldon of Boley in Worcestershire; by whom he had a son, who died soon after his father. He wrote, 1. *Commentaries or Reports of divers Cases, &c.* in the reigns of king Ed. VI. queen Mary, and queen Elizabeth; Lond. 1571, 78, 99, 1613, &c. Written in the old Norman language. 2. *Queries, or a Moot-book of cases, &c.* translated, methodized, and enlarged, by H. B. of Lincoln's-inn; Lond. 1662, 8vo.

PLUG, certain pieces of timber, formed like the frustum of a cone, and used to stop the haufe-holes, and the breaches made in the body of a ship by cannon-balls; the former of which are called *haufe-plugs*, and the latter *shot-plugs*, which are formed of various sizes in proportion to the holes made by the different sizes of shot, which may penetrate the ship's sides or bottom in battle; accordingly they are always ready for this purpose.

PLUKENET (Leonard), a physician who flourished in the reign of king Charles II. was one of the most excellent and laborious botanists of that or any other age. He was author of the *Phytographia Plucentium*, the *Almagestum Britannicum*, and other works of the like kind, on which he spent the greatest part of his life and fortune. His *Phytographia* is mentioned with the highest encomiums in the Philosophical Transactions for February 1696-7. His *Opera Botanica*, with cuts, were printed at London in 6 vols, fol. in 1720.

PLUM-TREE, in botany. See **PRUNUS**.

PLUMAGE, the feathers which serve birds for a covering. See **ORNITHOLOGY**, p. 5757.

PLUMB-LINE, among artificers, denotes a perpendicular to the horizon; so called, as being commonly erected by means of a plummet.

PLUMBERY, the art of casting and working lead, and using it in building.

As this metal melts soon and with little heat, it is easy to cast it into figures of any kind, by running it into moulds of brass, clay, plaster, &c. But the

chief article in plumbery is sheets and pipes of lead; Plumtery. and as these make the basis of the plumber's work, we shall here give the process of making them.

In casting *sheet-lead*, a table or mould is made use of, which consists of large pieces of wood well jointed, and bound with bars of iron at the ends; on the sides of which runs a frame consisting of a ledge or border of wood, three inches thick, and four inches high from the mould, called the *sharps*: the ordinary width of the mould, within these sharps, is from four to five feet; and its length is 16, 17, or 18 feet. This should be something longer than the sheets are intended to be, in order that the end where the metal runs off from the mould may be cut off, because it is commonly thin, or uneven, or ragged at the end. It must stand very even or level in breadth, and something falling from the end in which the metal is poured in, viz. about an inch, or an inch and a half, in the length of 16 or 17 feet or more, according to the thinness of the sheets wanted; for the thinner the sheet, the more declivity the mould should have. At the upper end of the mould stands the pan, which is a concave triangular prism, composed of two planks nailed together at right angles, and two triangular pieces fitted in between them at the ends. The length of this pan is the whole breadth of the mould in which the sheets are cast; it stands with its bottom, which is a sharp edge, on a form at the end of the mould, leaning with one side against it; and on the opposite side is a handle to lift it up by, to pour out the melted lead; and on that side of the pan next the mould, are two iron-hooks to take hold of the mould, and prevent the pan from slipping while the melted lead is pouring out of it into the mould. This pan is lined on the inside with moistened sand, to prevent it from being fired by the hot metal. The mould is also spread over, about two inches thick, with sand sifted and moistened, which is rendered perfectly level by moving over it a piece of wood called a *strike*, and smoothing it over with a smoothing plane, which is a plate of polished brass, about one-fourth of an inch thick, and nine inches square, turned up on all the four edges, and with a handle fitted on to the upper or concave side. The sand being thus smoothed, it is fit for casting sheets of lead: but if they would cast a cistern, they measure out the bigness of the four sides; and having taken the dimensions of the front or fore-part, make mouldings by pressing long slips of wood, which contain the same mouldings, into the level sand; and form the figures of birds, beasts, &c. by pressing in the same manner leaden figures upon it, and then taking them off, and at the same time smoothing the surface where any of the sand is raised up by making these impressions upon it. The rest of the operation is the same in casting either cisterns or plain sheets of lead: but before we proceed to mention the manner in which that is performed, it will be necessary to give a more particular description of the *strike*. The strike, then, is a piece of board about five inches broad, and something longer than the breadth of the mould on the inside; and at each end is cut a notch, about two inches deep, so that when it is used, it rides upon the sharps with those notches. Before they begin to cast, the strike is made ready by tacking on two pieces of an old hat on the notches, or by slipping a

case

Plumbery. case of leather over each end, in order to raise the under side about one-eighth of an inch, or something more, above the sand, according as they would have the sheet to be in thickness; then they tallo the under edge of the strike, and lay it across the mould. The lead being melted, it is put into the pan with ladles, in which, when there is a sufficient quantity for the present purpose, the scum of the metal is swept off with a piece of board to the edge of the pan, letting it settle on the sand, which is by this means prevented from falling into the mould at the pouring out of the metal. When the lead is cool enough, which much be regulated according to the thickness of the sheets wanted, and is known by its beginning to stand with a shell or wall on the sand round the pan, two men take the pan by the handle, or else one of them lift it by the bar and chain fixed to a beam in the ceiling, and pour it into the mould, while another man stands ready with the strike, and, as soon as they have done pouring in the metal, puts on the mould, sweeps the lead forward, and draws the overplus into a trough prepared to receive it. The sheets being thus cast, nothing remains but to roll them up, or cut them into any measure wanted: but if it be a cistern, it is bent into four sides, so that the two ends may join the back, where they are foldered together; after which the bottom is foldered up.

The method of casting pipes without foldering. To make these pipes they have a kind of little mill, with arms or levers to turn it withal. The moulds are of brass, and consist of two pieces, which open and shut by means of hooks and hinges, their inward caliber or diameter being according to the size of the pipe, usually two feet and a half. In the middle is placed a core or round piece of brass or iron, somewhat longer than the mould, and of the thickness of the inward diameter of the pipe. This core is passed through two copper rundles, one at each end of the mould, which they serve to close; and to these is joined a little copper tube about two inches long, and of the thickness the leaden pipe is intended to be of. By means of these tubes, the core is retained in the middle of the cavity of the mould. The core being in the mould, with the rundles at its two ends, and the lead melted in the furnace, they take it up in a ladle, and pour it into the mould by a little aperture at one end, made in the form of a funnel. When the mould is full, they pass a hook into the end of the core, and, turning the mill, draw it out; and then opening the mould, take out the pipe. If they desire to have the pipe lengthened, they put one end of it in the lower end of the mould, and pass the end of the core into it; then shut the mould again, and apply its rundle and tube as before, the pipe just cast serving for rundle, &c. at the other end. Things being thus replaced, they pour in fresh metal, and repeat the operation till they have got a pipe of the length required.

For making pipes of sheet-lead, the plumbers have wooden cylinders, of the length and thickness required; and on these they form their pipes by wrapping the sheet around them, and foldering up the edges all along them.

PLUMBUM, LEAD. See **LEAD**.

PLUMBUM Corneum, a combination of lead with the marine acid. See **CHEMISTRY**, n° 249.

PLUME, in botany, the bud or germ. See **PLUME GEMMA**.

PLUMIRE (Charles), a learned Minim, born at Marceilles, and one of the most able botanists of the 17th century. He was instructed by the famous Maignan, who taught him mathematics, turnery, the art of making spectacles, burning-glasses, microscopes, and other works. He at length went to Rome to perfect himself in his studies, and there applied himself entirely to botany under a skilful Italian. At his return to Provence, he settled in the convent at Bornes, a maritime place near Hieres, where he had the convenience of making discoveries in the fields with respect to simples. He was some time after sent by the French king to America, to bring from thence such plants as might be of service in medicine. He made three different voyages to the Antilles, and stopped at the island of St Domingo. The king honoured him with a pension; and he at last settled at Paris. However, at the desire of M Fagon, he prepared to go a fourth time to America, to examine the tree which produces the Jesuits bark; but died at the port of Santa Maria, near Cadiz, in 1706. He wrote several excellent works; the principal of which are, 1. A volume of the plants in the American Islands. 2. A treatise on the American fern. 3. The Art of Turnery; a curious work embellished with plates.

PLUMMET, **PLUMB-Rule**, or **Plumb-line**, an instrument used by carpenters, masons, &c. in order to judge whether walls, &c. be upright planes, horizontal, or the like. It is thus called from a piece of lead, fastened to the end of a chord, which usually constitutes this instrument. Sometimes the string descends along a wooden ruler, &c. raised perpendicularly on another; in which case it becomes a level.

PLUMMING, among miners, is the method of using a mine-dial, in order to know the exact place of the work where to sink down an air-shaft, or to bring an adit to the work, or to know which way the load inclines when any flexure happens in it.

It is performed in this manner: A skilful person, with an assistant, and with pen, ink, and paper, and a long line, and a sun-dial, after his gues of the place above ground, descends into the adit or work, and there fastens one end of the line to some fixed thing in it; then the incited needle is let to rest, and the exact point where it rests is marked with a pen: he then goes on farther in the line still fastened, and at the next flexure of the adit he makes a mark on the line by a knot or otherwise: and then letting down the dial again, he there likewise notes down that point at which the needle stands in this second position. In this manner he proceeds, from turning to turnings, marking down the points, and marking the line, till he comes to the intended place: this done, he ascends, and begins to work on the surface of the earth what he did in the adit, bringing the first knot in the line to such a place where the mark of the place of the needle will again answer its pointing, and continues this till he come to the desired place above ground, which is certain to be perpendicular over the part of the mine into which the air-shaft is to be sunk.

PLUMOSE, something formed in the manner of a feather, with a stem and fibres issuing from it on each

Plume

Plumose.

Plural
||
Plutarch.

each side; such are the antennæ of certain moths, butterflies, &c.

PLURAL, in grammar, an epithet applied to that number of nouns and verbs which is used when we speak of more than one thing. See GRAMMAR.

PLURALITY, a discrete quantity, consisting of two or a greater number of the same kind: thus we say, a plurality of gods, &c.

PLUS, in algebra, a character marked thus +, used for the sign of addition. See ALGEBRA, n° 2, 3.

PLUSH, in commerce, &c. a kind of stuff, having a sort of velvet knap, or flag, on one side, composed regularly of a woof of a single woollen thread, and a double warp; the one wool, of two threads twisted; the other goats or camels hair; tho' there are some plushes entirely of worsted, and others composed wholly of hair.

PLUTARCH, a great philosopher and historian of antiquity, who lived from the reign of Claudius to that of Hadrian, was born at Chæronea, a small city of Boeotia in Greece. Plutarch's family was ancient in Chæronea: his grandfather Lamprias was eminent for his learning, and a philosopher; and is often mentioned by Plutarch in his writings, as is also his father. Plutarch was initiated early in study, to which he was naturally inclined; and was placed under the care of Ammonius, an Egyptian, who, having taught philosophy with great reputation at Alexandria, from thence travelled into Greece, and settled at Athens. Under this master, he made great advances in knowledge; and like a thorough philosopher, more apt to regard things than words, he pursued this knowledge to the neglect of languages. The Roman language, at that time, was not only the language of Rome, but of Greece also; and much more used there than the French is now in England. Yet he was so far from regarding it then, that, as we learn from himself, he became not conversant in it till the declension of his life; and, though he is supposed to have resided in Rome near 40 years at different times, yet he never seems to have acquired a competent skill in it. But this was not the worst: he did not cultivate his mother-tongue with any great exactness; and hence that harshness, inequality, and obscurity in his style, which has so frequently and so justly been complained of.

After he was principled and grounded by Ammonius, having a soul insatiable of knowledge, he resolved to travel. Egypt was at that time, as formerly it had been, famous for learning; and probably the mystery-fulness of their doctrine might tempt him, as it had tempted Pythagoras and others, to go and converse with the priesthood of that country. This appears to have been particularly his business, by his treatise, "Of Isis and Osiris;" in which he shews himself versed in the ancient theology and philosophy of the wise men. From Egypt he returned into Greece; and visiting in his way all the academies and schools of the philosophers, gathered from them many of those observations with which he has abundantly enriched posterity. He does not seem to have been attached to any particular sect, but culled from each of them whatever he thought excellent and worthy to be regarded. He could not bear the paradoxes of the Stoics, but yet was more averse from the impiety of the Epicureans: in many things he followed Aristotle; but his favourites

Plutarch.

were Socrates and Plato, whose memory he revered so highly, that he annually celebrated their birth-days with much solemnity. Besides this, he applied himself with extreme diligence to collect, not only all books that were excellent in their kind, but also all the sayings and observations of wise men, which he had heard in conversation, or had received from others by tradition; and likewise to consult the records and public instruments preserved in cities which he had visited in his travels. He took a particular journey to Sparta, to search the archives of that famous commonwealth, to understand thoroughly the model of their ancient government, the history of their legislators, their kings, and their ephori; and digested all their memorable deeds and sayings with much care. He took the same methods with regard to many other commonwealths; and thus was enabled to leave us in his works such a rich cabinet of observations upon men and manners, as, in the opinion of Montaigne and Bayle, have rendered him the most valuable author of antiquity.

The circumstances of Plutarch's life are not known, and therefore cannot be related with any exactness. He was married; and his wife's name was *Timoxena*, as Ruadus conjectures with probability. He had several children, and among them two sons; one called *Plutarch* after himself; the other *Lamprias*, in memory of his grandfather. Lamprias was he, of all his children, who seems to have inherited his father's philosophy; and to him we owe the table or catalogue of Plutarch's writings, and perhaps also his apophthegms. He had a nephew, Sextus Chæroneus, who taught the learned emperor Marcus Aurelius the Greek tongue, and was much honoured by him. Some think, that the critic Longinus was of his family; and Apuleius, in the first book of his *Metamorphoses*, affirms himself to be descended from him.

On what occasion, and at what time of his life, he went to Rome, how long he lived there, and when he finally returned to his own country, are all uncertain. It is probable, that the fame of him went thither before him, not only because he had published several of his works, but because immediately upon his arrival, as there is reason to believe, he had a great resort of the Roman nobility to hear him: for he tells us himself, that he was so taken up in giving lectures of philosophy to the great men of Rome, that he had not time to make himself master of the Latin tongue, which is one of the first things that would naturally have engaged his attention. It appears that he was several times at Rome; and perhaps one motive to his inhabiting there was the intimacy he had contracted in some of these journeys with Sossius Senecio, a great and worthy man, who had been four times consul, and to whom Plutarch has dedicated many of his lives. But the great inducement which carried him first to Rome, was undoubtedly that which had carried him into so many other parts of the world; namely, to make observations upon men and manners, and to collect materials for writing the lives of the Roman worthies, in the same manner as he had already written those of the Grecian: and accordingly he not only conversed with all the living, but searched the records of the Capitol, and of all the libraries. Not but, as we learn from Suidas, he was intrusted also with the

Plutarch. management of public affairs in the empire, during his residence in the metropolis: "Plutarch (says he) lived in the time of Trajan, who bestowed on him the consular ornaments, and also caused an edict to be passed, that the magistrates or officers of Illyria should do nothing in that province without his knowledge and approbation."

When, and how, he was made known to Trajan, is likewise uncertain: but it is generally supposed, that Trajan, a private man when Plutarch first came to Rome, was, among other nobility, one of his auditors. It is also supposed, that this wise emperor made use of him in his councils; at least, much of the happiness of his reign has been imputed to Plutarch. We are equally at a loss concerning the time of his abode in the imperial city; which, however, at different times, is not imagined to fall much short of 40 years. The desire of visiting his native country, so natural to all men, and especially when growing old, prevailed with him at length to leave Italy; and at his return, he was unanimously chosen archon or chief magistrate of Chæronea, and not long after admitted into the number of the Delphic Apollo's priests. We have no particular account of his death, either as to the manner of it, or the year; only it is evident that he lived, and continued his studies, to an extreme old age.

His works have been divided, and they admit of a pretty equal division, into Lives and Morals: the former of which, in his own estimation, were to be preferred as more noble than the latter. His style, as we have already observed, has been excepted to with some reason: he has also been criticised for some mistakes in Roman antiquities, and for a little partiality to the Greeks. On the other hand, he has been justly praised for the copiousness of his fine sense and learning, for his integrity, and for a certain air of goodness which appears in all he wrote. His business was not to please the ear, but to instruct and charm the mind; and in this none ever went beyond him.

PLUTO, in Pagan worship, the king of the in-

fernal regions, was the son of Saturn and Ops, and the brother of Jupiter and Neptune. This deity finding himself childless and unmarried, mounted his chariot to visit the world; and arriving in Sicily, fell in love with Proserpine, whom he saw gathering flowers with her companions in the valley of Enna, near Mount Ætna; when forcing her into his chariot, he drove her to the river Chemarus, thro' which he opened himself a passage back to the realms of night. See CERES and PROSERPINE.

Pluto is usually represented in an ebony chariot drawn by four black horses; sometimes holding a sceptre, to denote his power; at others, a wand, with which he drives away the ghosts; and at others, some keys, to signify that he had the keys of death. Homer observes, that his helmet had the quality of rendering the wearer invisible, and that Minerva borrowed it in order to be concealed from Mars when he fought against the Trojans. Pluto was greatly revered both by the Greeks and Romans, who erected temples and altars to him. To this god sacrifices were offered in the night, and it was not lawful to offer them by day.

PLUTUS, in Pagan worship, the god of riches, is frequently confounded with Pluto. He was represented as appearing lame when he approached, and with wings at his departure; to show the difficulty of amassing wealth, and the uncertainty of its enjoyment. He was also frequently represented blind, to show that he often bestowed his favours on the most unworthy, and left in necessity those who had the greatest merit.

PLUVIALIS. See CHARADRIUS.

PLYING, in the sea-language, the act of making, or endeavouring to make, a progress against the direction of the wind. Hence a ship, that advances well in her course in this manner of sailing, is said to be a good plying. See the articles BEATING and TACKLING.

Pluto
Plying.

P N E U M A T I C S.

PNEUMATICS, called also **PNEUMATOLOGY** and *Pneumatophy*, among schoolmen, the doctrine and contemplation of spirits and spiritual substances, as God, angels, and the human soul; in which sense *pneumatics* are the same with what we otherwise call *metaphysics*. See the article **METAPHYSICS**.

PNEUMATICS is more commonly used among us for that branch of natural philosophy which treats of the weight, pressure, and elasticity of the Air, and the effects arising from it.

SECT. I. Of the Properties of Air.

THE air is that thin transparent fluid body in which we live and breathe. It encompasses the whole earth to a considerable height; and, together with the clouds and vapours that float in it, is called the *atmosphere*. The air is justly reckoned among the number of fluids, because it has all the properties by which a fluid is distinguished. For, it yields to the least force impressed, its parts are easily moved among one ano-

ther, it presses according to its perpendicular height, and its pressure is every way equal.

That the air is a fluid, consisting of such particles as have no cohesion betwixt them, but easily glide over one another, and yield to the slightest impression, appears from that ease and freedom with which animals breathe in it, and move through it without any difficulty or sensible resistance.

But it differs from all other fluids in the three following particulars. 1. It can be compressed into a much less space than that which it naturally possesseth. 2. It cannot be congealed or fixed, as other fluids may. 3. It is of a different density in every part, upward from the earth's surface; decreasing in its weight, bulk for bulk, the higher it rises; and therefore must also decrease in density. 4. It is of an elastic or spongy nature, and the force of its spring is equal to its weight.

That air is a body, is evident from its excluding all other bodies out of the space it possesses: for if a glass jar be plunged with its mouth downwards into

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a vessel of water, there will but very little water get into the jar, because the air of which it is full keeps the water out.

As air is a body, it must needs have gravity or weight: and that it is weighty, is demonstrated by experiment. For, let the air be taken out of a vessel by means of the air-pump, then having weighed the vessel, let in the air again, and upon weighing it, when re-filled with air, it will be found considerably heavier. Thus, a bottle that holds a wine quart, being emptied of air and weighed, is found to be about 17 grains lighter than when the air is let into it again; which shews that a quart of air weighs 17 grains. But a quart of water weighs 1462½ grains; thus divided by 17, quotes 860 in round numbers; which shews, that water is 860 times as heavy as air near the surface of the earth.

As the air rises above the earth's surface, it grows rarer, and consequently lighter, bulk for bulk. For since it is of an elastic or springy nature, and its lowermost parts are pressed with the weight of all that is above them, it is plain that the air must be more dense or compact at the earth's surface, than at any height above it; and gradually rarer the higher up. For the density of the air is always as the force that compresseth it: and therefore the air towards the upper parts of the atmosphere being less pressed than that which is near the earth, it will expand itself, and thereby become thinner than at the earth's surface.

Dr Cotes has demonstrated, that if altitudes in the air be taken in arithmetical proportion, the rarity of the air will be in geometrical proportion. For instance,

At the altitude of	7	-	-	-	4
	14	-	-	-	16
	21	-	-	-	64
	28	-	-	-	256
	35	-	-	-	1024
	42	-	-	-	4096
	49	-	-	-	16384
	56	-	-	-	65536
	63	-	-	-	262144
	70	-	-	-	1048576
	77	-	-	-	4194304
	84	-	-	-	16777216
	91	-	-	-	67108864
	98	-	-	-	268435456
	105	-	-	-	1073741824
	112	-	-	-	4294967296
	119	-	-	-	17179869184
	126	-	-	-	68719476736
Miles above the surface of the earth, the air is	133	-	-	-	274877906944
	140	-	-	-	1099511627776

times thinner and lighter than at the earth's surface.

And hence it is easy to prove by calculation, that a cubic inch of such air as we breathe would be so much rarefied at the altitude of 500 miles, that it would fill a sphere equal in diameter to the orbit of Saturn.

The weight or pressure of the air is exactly determined by the following experiment.

Take a glass tube about three feet long, and open at one end; fill it with quicksilver, and, putting your finger upon the open end, turn that end downward,

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and immerse it into a small vessel of quicksilver, without letting in any air: then take away your finger, and the quicksilver will remain suspended in the tube $29\frac{1}{2}$ inches above its surface in the vessel; sometimes more, and at other times less, as the weight of the air is varied by winds and other causes. That the quicksilver is kept up in the tube by the pressure of the atmosphere upon that in the bason, is evident; for, if the bason and tube be put under a glass, and the air be then taken out of the glass, all the quicksilver in the tube will fall down into the bason; and if the air be let in again, the quicksilver will rise to the same height as before. Therefore the air's pressure on the surface of the earth is equal to the weight of $29\frac{1}{2}$ inches depth of quicksilver all over the earth's surface, at a mean rate.

A square column of quicksilver, $29\frac{1}{2}$ inches high, and one inch thick, weighs just 15 pounds, which is equal to the pressure of air upon every square inch of the earth's surface; and 144 times as much, or 2160 pounds, upon every square foot; because a square foot contains 144 square inches. At this rate, a middle-sized man, whose surface may be about 14 square feet, sustains a pressure of 30240 pounds, when the air is of a mean gravity: a pressure which would be insupportable, and even fatal to us, were it not equal on every part, and counterbalanced by the spring of the air within us, which is diffused through the whole body, and re-acts with an equal force against the outward pressure.

Now, since the earth's surface contains (in round numbers) 200,000,000 square miles, and every square mile 27,878,400 square feet, there must be 5,575,680,000,000,000 square feet on the earth's surface; which multiplied by 2160 pounds (the pressure on each square foot) gives 12,043,468,800,000,000,000 pounds for the pressure or weight of the whole atmosphere.

When the end of a pipe is immersed in water, and the air is taken out of the pipe, the water will rise in it to the height of 33 feet above the surface of the water in which it is immersed; but will go no higher: for it is found, that a common pump will draw water no higher than 33 feet above the surface of the well; and unless the bucket goes within that distance from the well, the water will never get above it. Now, as it is the pressure of the atmosphere on the surface of the water in the well that causes the water to ascend in the pump, and follow the piston or bucket, when the air above it is lifted up; it is evident, that a column of water 33 feet high, is equal in weight to a column of quicksilver of the same diameter, $29\frac{1}{2}$ inches high; and to as thick a column of air, reaching from the earth's surface to the top of the atmosphere.

In serene calm weather, the air has weight enough to support a column of quicksilver 31 inches high; but in tempestuous stormy weather, not above 28 inches. The quicksilver thus supported in a glass tube, is found to be a nice counterbalance to the weight or pressure of the air, and to shew its alterations at different times. And being now generally used to denote the changes in the weight of the air, and of the weather consequent upon them, it is called the *barometer* or *weather-glass*. See *BAROMETER*.

The pressure of the air being equal on all sides of a body

35 E

body

ii.
The Torricellian experiment.

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Experiments.

body exposed to it, the softest bodies sustain this pressure without suffering any change in their figure; and so do the most brittle bodies without being broke.

SECT. II. Experiments with the Air-pump, shewing the Resistance, Weight, and Elasticity of the Air.

Plate
CCXLIII
fig. 8.

iii.
The air-
pump.

The Air-pump being in effect the same as the water-pump, whoever understands the one will be at no loss to understand the other.

Having put a wet leather on the plate LL of the air-pump, place the glass-receiver M upon the leather, so that the hole *i* in the plate may be within the glass. Then turning the handle F backward and forward, the air will be pumped out of the receiver; which will then be held down to the plate by the pressure of the external air or atmosphere: for as the handle (fig. 9.) is turned backwards, it raises the piston *de* in the barrel BK, by means of the wheel F and rack Dd; and as the piston is leathered so tight as to fit the barrel exactly, no air can get between the piston and barrel: and therefore all the air above *d* in the barrel is lifted up towards B, and a vacuum is made in the barrel from *e* to *b*; upon which, part of the air in the receiver M (fig. 8.), by its spring, rushes through the hole *i*, in the brass plate LL, along the pipe GCG, (which communicates with both barrels by the hollow trunk IHK (fig. 9.), and pushing up the valve *b*, enters into the vacant place *be* of the barrel BK: for wherever the resistance or pressure is taken off, the air will run to that place, if it can find a passage.—Then as the handle F is turned forward, the piston *de* will be depressed in the barrel; and as the air which had got into the barrel cannot be pushed back through the valve *b*, it will ascend through a hole in the piston, and escape through the valve at *d*, and be hindered by that valve from returning into the barrel when the piston is again raised. At the next raising of the piston, a vacuum is again made in the same manner as before, between *b* and *e*; upon which more of the air which was left in the receiver M, gets out thence by its spring, and runs into the barrel BK, through the valve B. The same thing is to be understood with regard to the other barrel AI; and as the handle F is turned backwards and forwards, it alternately raises and depresses the pistons in their barrels; always raising one whilst it depresses the other. And as there is a vacuum made in each barrel when its piston is raised, every particle of air in the receiver M pushes out another, by its spring or elasticity, through the hole *i*, and pipe GCG, into the barrels; until at last the air in the receiver comes to be so much dilated, and its spring so far weakened, that it can no longer get thro' the valves; and then no more can be taken out. Hence there is no such thing as making a perfect vacuum in the receiver; for the quantity of air taken out at any one stroke, will always be as the density thereof in the receiver: and therefore it is impossible to take it all out; because, supposing the receiver and barrels of equal capacity, there will be always as much left as was taken out at the last turn of the handle.

There is a cock *k* below the pump-plate, which being turned, lets the air into the receiver again; and then the receiver becomes loose, and may be taken off the plate. The barrels are fixed to the frame Eee by two screw-nuts *ff*, which press down the top-piece E upon the barrels; and the hollow trunk H (in fig. 9.) is covered by a box, as GH in fig. 8.

There is a glass tube *lmnmn* open at both ends, and about 34 inches long; the upper end communicating with the hole in the pump-plate, and the lower end immersed in quicksilver at *n* in the vessel N. To this tube is fitted a wooden ruler *mm*, called the *gag*, which is divided into inches and parts of an inch, from the bottom at *n*, (where it is even with the surface of the quicksilver), and continued up to the top, a little below *l*, to 30 or 31 inches.

As the air is pumped out of the receiver M, it is likewise pumped out of the glass tube *lmn*, because that tube opens into the receiver through the pump-plate; and as the tube is gradually emptied of air, the quicksilver in the vessel N is forced up into the tube by the pressure of the atmosphere. And if the receiver could be perfectly exhausted of air, the quicksilver would stand as high in the tube as it does at that time in the barometer: for it is supported by the same power or weight of the atmosphere in both (A).

The quantity of air exhausted out of the receiver on each turn of the handle, is always proportionable to the ascent of the quicksilver on that turn; and the quantity of air remaining in the receiver, is proportionable to the defect of the height of the quicksilver in the gag from what it is at that time in the barometer.

1. There is a little machine, consisting of two mills, *a* and *b*, which are of equal weights, independent of Experiments to show the air's resistance. Fig. 10.
each other, and turn equally free on their axis in the frame. Each mill has four thin arms or sails fixed into the axis: those of the mill *a* have their planes at right angles to its axis; and those of *b* have their planes parallel to it. Therefore, as the mill *a* turns round in common air, it is but little resisted thereby, because its sails cut the air with their thin edges; but the mill *b* is much resisted, because the broad sides of its sails move against the air when it turns round. In each axle is a pin near the middle of the frame, which goes quite through the axle, and stands out a little on each side of it: upon these pins the slider *d* may be made to bear, and so hinder the mills from going, when the strong spring *c* is set on bend against the opposite ends of the pins.

Having set this machine upon the pump-plate LL, (fig. 8.) draw up the slider *d* to the pins on one side, and set the spring *c* at bend upon the opposite ends of the pins: then push down the slider *d*, and the spring acting equally strong upon each mill, will set them both a-going with equal forces and velocities: but the mill *a* will run much longer than the mill *b*, because the air makes much less resistance against the edges of its sails than against the sides of the sails of *b*.

Draw up the slider again, and set the spring upon the pins as before; then cover the machine with the receiver M (fig. 8.) upon the pump-plate; and having exhausted

(A) Such is the common construction. But there is another invented by Mr Smeaton; by which a purer vacuum is obtained, and which also acts as a condensing engine. There is, moreover, what they call a portable air-pump, which is placed on a table, and may be easily conveyed from one place to another. See the article (Air)-PUMP.

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ments.

ed the receiver of air, push down the wire PP (thro' the collar of leathers in the neck *g*) upon the slider; which will disengage it from the pins, and allow the mills to turn round by the impulse of the spring: and as there is no air in the receiver to make any sensible resistance against them, they will both move a considerable time longer than they did in the open air; and the moment that one stops, the other will do so too.—This shows, that air resists bodies in motion; and that equal bodies meet with different degrees of resistance, according as they present greater or less surfaces to the air, in the planes of their motions.

2. Take off the receiver M and the mills; and having put the guinea *a* and feather *b* upon the brads flap *e*, turn up the flap, and shut it into the notch *d*. Then putting a wet leather over the top of the tall receiver AB (it being open both at top and bottom) cover it with the plate C, from which the guinea-and-feather tongs *e d* will then hang within the receiver. This done, pump the air out of the receiver, and then draw up the wire *f* a little, which by a square piece on its lower end will open the tongs *ed*; and the flap falling down as at *e*, the guinea and feather will descend with equal velocities in the receiver, and both will fall upon the pump-plate at the same instant. *N.B.* In this experiment, the observers ought not to look at the top, but at the bottom, of the receiver, in order to see the guinea and feather fall upon the plate; otherwise, on account of the quickness of their motion, they will escape the sight of the beholders.

Fig. 11.

to show the weight of the air.

1. Having fitted a brads cap, with a valve tied over it, to the mouth of a thin bottle or Florence flask, whose contents are exactly known, screw the neck of this cap into the hole *i* of the pump-plate; then having exhausted the air out of the flask, and taken it off from the pump, let it be suspended at one end of a balance, and nicely counterpoised by weights in the scale at the other end; this done, raise up the valve with a pin, and the air will rush into the flask with an audible noise: during which time, the flask will descend, and pull down that end of the beam. When the noise is over, put as many grains into the scale at the other end as will restore the equilibrium; and they will shew exactly the weight of the quantity of air which has got into the flask and filled it. If the flask holds an exact quart, it will be found, that 17 grains will restore the equipoise of the balance, when the quicksilver stands at 29½ inches in the barometer: which shows, that when the air is at a mean rate of density, a quart of it weighs 17 grains: it weighs more when the quicksilver stands higher, and less when it stands lower.

2. Place the small receiver O (fig. 8.) over the hole *i* in the pump-plate; and upon exhausting the air, the receiver will be fixed down to the plate by the pressure of the air on its outside, which is left to act alone, without any air in the receiver to act against it: and this pressure will be equal to as many times 15 pounds as there are square inches in that part of the plate which the receiver covers; which will hold down the receiver so fast, that it cannot be got off until the air be let into it by turning the cock *k*; and then it becomes loose.

Fig. 12.

3. Set the little glass AB (which is open at both

2

ends) over the hole *i* upon the pump-plate LL, and put your hand close upon the top of it at B; then, upon exhausting the air out of the glass, you will find your hand pressed down with a great weight upon it; so that you can hardly release it until the air be re-admitted into the glass by turning the cock *k*; which air, by acting as strongly upward against the hand as the external air acted in pressing it downward, will release the hand from its confinement.

4. Having tied a piece of wet bladder *b* over the open top of the glass A, (which is also open at bottom), set it to dry, and then the bladder will be tight like a drum. Then place the open end A upon the pump-plate over the hole *i*, and begin to exhaust the air out of the glass. As the air is exhausting, its spring in the glass will be weakened, and give way to the pressure of the outward air on the bladder; which, as it is pressed down, will put on a spherical concave figure, which will grow deeper and deeper, until the strength of the bladder be overcome by the weight of the air; and then it will break with a report as loud as that of a gun.—If a flat piece of glass be laid upon the open top of this receiver, and joined to it by a flat ring of wet leather between them, upon pumping the air out of the receiver, the pressure of the outward air upon the flat glass will break it all to pieces.

Fig. 13.

5. Immerse the neck *cd* of the hollow glass-ball *e b* in water, contained in the phial *a a*; then set it upon the pump-plate, and cover it and the hole *i* with the close receiver A; and then begin to pump out the air. As the air goes out of the receiver by its spring, it will also by the same means go out of the hollow ball *eb*, through the neck *dc*, and rise up in bubbles to the surface of the water in the phial; from whence it will make its way, with the rest of the air in the receiver, through the air-pipe GG and valves *a* and *b*, into the open air. When it has done bubbling in the phial, the ball is sufficiently exhausted; and then, upon turning the cock *k*, the air will get into the receiver, and press so upon the surface of the water in the phial, as to force the water up into the ball in a jet, through the neck *cd*, and will fill the ball almost full of water. The reason why the ball is not quite filled, is because all the air could not be taken out of it; and the small quantity that was left in, and had expanded itself so as to fill the whole ball, is now condensed into the same state as the outward air, and remains in a small bubble at the top of the ball, and so keeps the water from filling that part of the ball.

Fig. 14.

6. Pour some quicksilver into the jar D, and set it upon the pump-plate near the hole *i*; then set on the tall open receiver AB, so as to be over the jar and hole; and cover the receiver with the brads-plate C. Screw the open glass tube *fg* (which has a brads top on it at *h*) into the syringe H; and putting the tube through a hole in the middle of the plate, so as to immerse the lower end of the tube *e* in the quicksilver at D, screw the end *b* of the syringe into the plate. This done, draw up the piston in the syringe by the ring I, which will make a vacuum in the syringe below the piston; and as the upper end of the tube opens into the syringe, the air will be dilated in the tube, because part of it by its spring gets up into the syringe; and the spring of the undilated air in the receiver acting upon the surface of the quicksilver in the

jar,

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ments.

jar, will force part of it up into the tube; for the quicksilver will follow the piston in the syringe, in the same way, and for the same reason, that water follows the piston of a common pump when it is raised in the pump-barrel; and this, according to some, is done by suction. But to refute that erroneous notion, let the air be pumped out of the receiver *AB*, and then all the quicksilver in the tube will fall down by its own weight into the jar, and cannot be again raised one hair's-breadth in the tube by working the syringe: which shows that suction had no hand in raising the quicksilver: and to prove that it is done by pressure, let the air into the receiver by the cock *k* (fig. 8.), and its action upon the surface of the quicksilver in the jar will raise it up into the tube, although the piston of the syringe continues motionless.—If the tube be about 32 or 33 inches high, the quicksilver will rise in it very near as high as it stands at that time in the barometer. And if the syringe has a small hole, as *m*, near the top of it, and the piston be drawn up above that hole, the air will rush through the hole into the syringe and tube, and the quicksilver will immediately fall down into the jar. If this part of the apparatus be air-tight, the quicksilver may be pumped up into the tube to the same height that it stands in the barometer; but it will go no higher, because then the weight of the column in the tube is the same as the weight of a column of air of the same thickness with the quicksilver, and reaching from the earth to the top of the atmosphere.

Fig. 16.

7. Having placed the jar *A*, with some quicksilver in it, on the pump-plate, as in the last experiment, cover it with the receiver *B*; then push the open end of the glass tube *d e* through the collar of leathers in the brass neck *C* (which it fits so as to be air-tight) almost down to the quicksilver in the jar. Then exhaust the air out of the receiver, and it will also come out of the tube, because the tube is close at top. When the gauge *mm* shews that the receiver is well exhausted, push down the tube so as to immerse its lower end into the quicksilver in the jar. Now, although the tube be exhausted of air, none of the quicksilver will rise into it, because there is no air left in the receiver to press upon its surface in the jar: but let the air into the receiver by the cock *k*, and the quicksilver will immediately rise in the tube, and stand as high in it as it was pumped up in the last experiment.

Both these experiments show, that the quicksilver is supported in the barometer by the pressure of the air on its surface in the box, in which the open end of the tube is placed: And that the more dense and heavy the air is, the higher does the quicksilver rise; and, on the contrary, the thinner and lighter the air is, the more will the quicksilver fall. For if the handle *F* be turned ever so little, it takes some air out of the receiver, by raising one or other of the pistons in its barrel; and consequently, that which remains in the receiver is so much the rarer, and has so much the less spring and weight; and thereupon the quicksilver falls a little in the tube: but upon turning the cock, and re-admitting the air into the receiver, it becomes as weighty as before, and the quicksilver rises again to the same height.—Thus we see the reason why the quicksilver in the barometer falls before rain or snow, and rises before fair weather; for, in the former case,

the air is too thin and light to bear up the vapours, and in the latter, too dense and heavy to let them fall.

[*N. B.* In all mercurial experiments with the air-pump, a short pipe must be screwed into the hole *i*, so as to rise about an inch above the plate, to prevent the quicksilver from getting into the air-pipe and barrels, in case any of it should be accidentally spilt over the jar: for if it once gets into the pipes or barrels, it spoils them, by loosening the solder, and corroding the brads.]

8. Take the tube out of the receiver, and put one end of a bit of dry hazel-branch, about an inch long, tight into the hole, and the other end tight into a hole quite through the bottom of a small wooden cup: then pour some quicksilver into the cup, and exhaust the receiver of air; and the pressure of the outward air on the surface of the quicksilver will force it through the pores of the hazel, from whence it will descend in a beautiful shower into a cup placed under the receiver to catch it.

9. Put a wire through the collar of leathers in the top of the receiver, and fit a bit of dry wood on the end of the wire within the receiver; then exhaust the air, and push the wire down, so as to immerse the wood into a jar of quicksilver on the pump-plate. This done, let in the air; and upon taking the wood out of the jar, and splitting it, its pores will be found full of quicksilver, which the force of the air, upon being let into the receiver, drove into the wood.

10. Join the two brass hemispherical cups *A* and *B* Fig. 17. together, with a wet leather between them, having a hole in the middle of it; then screw the end *D* of the pipe *CD* into the plate of the pump at *i*, and turn the cock *E*, so as the pipe may be open all the way into the cavity of the hemispheres: then exhaust the air out of them, and turn the cock a quarter round, which will shut the pipe *CD*, and keep out the air. This done, unscrew the pipe at *D* from the pump; and screw the piece *Fh* upon it at *D*; and let two strong men try to pull the hemispheres asunder by the rings *g* and *h*, which they will find hard to do: for if the diameter of the hemispheres be four inches, they will be pressed together by the external air with a force equal to 188 pounds. And to shew that it is the pressure of the air that keeps them together, hang them by either of the rings upon the hook *P* of the wire in the receiver *M* (fig. 8.), and upon exhausting the air out of the receiver they will fall asunder of themselves.

11. Place a small receiver *O* (fig. 8.) near the hole *i* on the pump-plate, and cover both it and the hole with the receiver *M*; and turn the wire *fo* by the top *P*, that its hook may take hold of the little receiver by a ring at its top, allowing that receiver to stand with its own weight on the plate. Then, upon working the pump, the air will come out of both receivers; but the large one *M* will be forcibly held down to the pump by the pressure of the external air; whilst the small one *O*, having no air to press upon it, will continue loose, and may be drawn up and let down at pleasure, by the wire *PP*. But, upon letting it quite down to the plate, and admitting the air into the receiver *M*, by the cock *k*, the air will press so strongly upon the small receiver *O*, as to fix it down to the plate; and at the same time, by counterbalancing the outward pressure on the large receiver *M*, it will become loose. This experiment

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ment evidently shows, that the receivers are held down by pressure, and not by suction: for the internal receiver continued loose whilst the operator was pumping, and the external one was held down; but the former became fast immediately by letting in the air upon it.

Fig. 19.

12. Screw the end A of the brass pipe ABF into the hole of the pump-plate, and turn the cock *e* until the pipe be open; then put a wet leather upon the plate *cd*, which is fixed on the pipe, and cover it with the tall receiver GH, which is close at top: then exhale the air out of the receiver, and turn the cock *e* to keep it out; which done, unscrew the pipe from the pump, and let its end A into a bafon of water, and turn the cock *e* to open the pipe; on which, as there is no air in the receiver, the pressure of the atmosphere on the water in the bafon will drive the water forcibly through the pipe, and make it play up in a jet to the top of the receiver.

13. Set the square phial A (fig. 21.) upon the pump-plate, and having covered it with the wire-cage B, put a close receiver over it, and exhale the air out of the receiver; in doing of which, the air will also make its way out of the phial through a small hole in its neck under the valve *b*. When the air is exhausted, turn the cock below the plate, to re-admit the air into the receiver; and as it cannot get into the phial again because of the valve, the phial will be broken into some thousands of pieces by the pressure of the air upon it. Had the phial been of a round form, it would have sustained this pressure like an arch, without breaking; but as its sides are flat, it cannot.

vi.
To show the
elasticity or
spring of the
air.

14. Tie up a very small quantity of air in a bladder, and put it under a receiver; then exhale the air out of the receiver; and the small quantity which is confined in the bladder (having nothing to act against it) will expand itself so by the force of its spring, as to fill the bladder as full as it could be blown of common air. But upon letting the air into the receiver again, it will overpower the air in the bladder, and press its sides almost close together.

15. If the bladder so tied up be put into a wooden box, and have 20 or 30 pounds weight of lead put upon it in the box, and the box be covered with a close receiver; upon exhaling the air out of the receiver, that air which is confined in the bladder will expand itself so, as to raise up all the lead by the force of its spring.

Fig. 14.

16. Take the glass ball mentioned in the fifth experiment, which was left full of water all but a small bubble of air at top; and having let it with its neck downward into the empty phial *aa*, and covered it with a close receiver, exhale the air out of the receiver; and the small bubble of air in the top of the ball will expand itself so as to force all the water out of the ball into the phial.

Fig. 18.

17. Screw the pipe AB into the pump-plate; place the tall receiver GH upon the plate *cd*, as in the 12th experiment; and exhale the air out of the receiver: then turn the cock *e* to keep out the air, unscrew the pipe from the pump, and screw it into the mouth of the copper vessel CC (fig. 22.), the vessel having first been about half filled with water. Then open the cock *e*, (fig. 18.); and the spring of the air which is confined in the copper vessel will force the water up through the pipe AB in a jet into the exhausted receiver, as strong-

ly as it did by its pressure on the surface of the water in a bafon, in the 12th experiment.

18. If a fowl, a cat, rat, mouse, or bird, be put under a receiver, and the air be exhausted, the animal will be at first oppressed as with a great weight, then grow convulsed, and at last expire in all the agonies of a most bitter and cruel death. But as this experiment is too shocking to every spectator who has the least degree of humanity, some substitute a machine called the *lungs-glass* in place of the animal.

19. If a butterfly be suspended in a receiver by a fine thread tied to one of its horns, it will fly about in the receiver as long as the receiver continues full of air; but if the air be exhausted, though the animal will not die, and will continue to flutter its wings, it cannot remove itself from the place where it hangs in the middle of the receiver until the air be let in again; and then the animal will fly about as before.

20. Pour some quicksilver into the small bottle A, Fig. 19; and screw the brass collar *c* of the tube BC into the brass neck *b* of the bottle, and the lower end of the tube will be immerged into the quicksilver, so that the air above the quicksilver in the bottle will be confined there, because it cannot get out about the joinings, nor can it be drawn out through the quicksilver into the tube. This tube is also open at top, and is to be covered with the receiver G and large tube EF; which tube is fixed by brass collars to the receiver, and is close at the top. This preparation being made, exhale the air both out of the receiver and its tube; and the air will by the same means be exhausted out of the inner tube BC, through its open top at C; and as the receiver and tubes are exhausting, the air that is confined in the glass bottle A will press so by its spring upon the surface of the quicksilver, as to force it up in the inner tube as high as it was raised in the ninth experiment by the pressure of the atmosphere: which demonstrates, that the spring of the air is equivalent to its weight.

21. Screw the end C of the pipe CD into the hole of the pump-plate, and turn all the three cocks *d*, *G*, and *H*, so as to open the communications between all the three pipes E, F, DC, and the hollow trunk AB. Then cover the plates *g* and *b* with wet leathers, which have holes in their middle where the pipes open into the plates; and place the close receiver I upon the plate G: this done, shut the pipe F by turning the cock H, and exhale the air out of the receiver I. Then turn the cock *d* to shut out the air, unscrew the machine from the pump, and having screwed it to the wooden foot L, put the receiver K upon the plate *b*; this receiver will continue loose on the plate as long as it keeps full of air; which it will do until the cock H be turned to open the communication between the pipes F and E, through the trunk AB; and then the air in the receiver K, having nothing to act against its spring, will run from K into I, until it be so divided between these receivers as to be of equal density in both; and then they will be held down with equal forces to their plates by the pressure of the atmosphere, though each receiver will then be kept down but with one half of pressure upon it that the receiver I had when it was exhausted of air; because it has now one half of the common air in it which filled the receiver K when it was set upon the plate; and therefore, a force equal to half

half the force of the spring of common air, will act within the receivers against the whole pressure of the common air upon their outside. This is called *transferring the air out of one vessel into another*.

Fig. 21.

22. Put a cork into the square phial A, and fix it in with wax or cement; put the phial upon the pump-plate with the wire cage B over it, and cover the cage with a clofe receiver. Then exhaust the air out of the receiver; and the air that was corked up in the phial will break the phial outwards by the force of its spring, because there is no air left on the outside of the phial to act against the air within it.

23. Put a shrivelled apple under a clofe receiver, and exhaust the air; then the spring of the air within the apple will plump it out, so as to cause all the wrinkles disappear; but upon letting the air into the receiver again to press upon the apple, it will instantly return to its former decayed and shrivelled state.

24. Take a fresh egg, and cut off a little of the shell and film from its smallest end; then put the egg under a receiver, and pump out the air; upon which all the contents in the egg will be forced out into the receiver by the expansion of a small bubble of air contained in the great end between the shell and film.

25. Put some warm beer in a glass; and having set it on the pump, cover it with a clofe receiver, and then exhaust the air. Whilst this is doing, and thereby the pressure more and more taken off from the beer in the glass, the air therein will expand itself, and rise up in innumerable bubbles to the surface of the beer; and from thence it will be taken away with the other air in the receiver. When the receiver is nearly exhausted, the air in the beer, which could not disentangle itself quick enough to get off with the rest, will now expand itself so, as to cause the beer to have all the appearance of boiling; and the greatest part of it will go over the glass.

26. Put some warm water in a glass, and put a bit of dry wainscot or other wood into the water. Then cover the glass with a clofe receiver, and exhaust the air; upon which the air in the wood, having liberty to expand itself, will come out plentifully, and make all the water to bubble about the wood, especially about the ends, because the pores lie lengthwise. A cubic inch of dry wainscot has so much air in it, that it will continue bubbling for near half an hour together.

vii.
Miscellaneous experi-
ments.

27. Screw the syringe H (fig. 15.) to a piece of lead that weighs one pound at least; and holding the lead in one hand, pull up the piston in the syringe with the other; then quitting hold of the lead, the air will push it upward, and drive back the syringe upon the piston. The reason of this is, that the drawing up of the piston makes a vacuum in the syringe; and the air, which presses every way equally, having nothing to resist its pressure upward, the lead is thereby pressed upward contrary to its natural tendency by gravity. If the syringe be loaded be hung in a receiver, and the air be exhausted, the syringe and lead will descend upon the piston-rod by their natural gravity; and upon admitting the air into the receiver, they will be drove upward again until the piston be at the very bottom of the syringe.

28. Let a large piece of cork be suspended by a thread at one end of a balance, and counterpoised by a leaden

weight, suspended in the same manner, at the other. Let this balance be hung to the inside of the top of a large receiver; which being set on the pump, and the air exhausted, the cork will preponderate, and show itself to be heavier than the lead; but upon letting in the air again, the equilibrium will be restored. The reason of this is, that since the air is a fluid, and all bodies lose as much of their absolute weight in it as is equal to the weight of their bulk of the fluid, the cork being the larger body, loses more of its real weight than the lead does; and therefore must in fact be heavier, to balance it under the disadvantage of losing some of its weight: which disadvantage being taken off by removing the air, the bodies then gravitate according to their real quantities of matter, and the cork, which balanced the lead in air, shows itself to be heavier when *in vacuo*.

29. Set a lighted candle upon the pump, and cover it with a tall receiver. If the receiver holds a gallon, the candle will burn a minute; and then, after having gradually decayed from the first instant, it will go out: which shews, that a constant supply of fresh air is necessary to feed flame; and so it also is for animal-life. For a bird kept under a clofe receiver will soon die, although no air be pumped out; and it is found that, in the diving-bell, a gallon of air is sufficient only for one minute for a man to breathe in.

The moment when the candle goes out, the smoke will be seen to ascend to the top of the receiver, and there it will form a sort of cloud: but upon exhausting the air, the smoke will fall down to the bottom of the receiver, and leave it as clear at the top as it was before it was set upon the pump. This shews, that smoke does not ascend on account of its being positively light, but because it is lighter than air; and its falling to the bottom when the air was taken away, shews that it is not destitute of weight. So moist fumes would ascend or swim in water; and yet there are none who doubt of the wood's having gravity or weight.

30. Set a receiver, which is open at top, upon the air-pump, and cover it with a brass plate and wet leather; and having exhausted it of air, let the air in again at top through an iron pipe, making it pass thro' a charcoal flame at the end of the pipe; and when the receiver is full of that air, lift up the cover and let down a mouse or bird into the receiver, and the burnt air will immediately kill it. If a candle be let down into the air, it will go out directly; but by letting it down gently, it will purify the air so far as it goes; and so, by letting it down more and more, all the air in the receiver will be purified.

31. Set a bell upon a cushion on the pump-plate, and cover it with a receiver; then shake the pump to make the clapper strike against the bell, and the sound will be very well heard: but exhaust the receiver of air, and then, if the clapper be made to strike ever so hard against the bell, it will make no sound at all; which shews that air is absolutely necessary for the propagation of sound.

32. Let a candle be placed on one side of a receiver, and viewed through the receiver at some distance; then, as soon as the air begins to be exhausted, the receiver will be filled with vapours which rise from the wet leather, by the spring of the air in it; and the light of the candle being refracted through that medium of vapours,

Experiments.

vapours, will have the appearance of circles of vapour colours, of a faint resemblance to those in the rain-bow.

THE elastic air which is contained in many bodies, and is kept in them by the weight of the atmosphere, may be got out of them either by boiling, or by the air-pump, as shewn in the 25th experiment: but the fixed air, which is by much the greater quantity, cannot be got out but by distillation, fermentation, or putrefaction.

If fixed air did not come out of bodies with difficulty, and spend some time in extricating itself from them, it would tear them to pieces. Trees would be rent by the change of air from a fixed to an elastic state, and animals would be burst in pieces by the explosion of air in their food.

Dr Hales found by experiment, that the air in apples is so much condensed, that if it were let out into the common air, it would fill a space 48 times as great as the bulk of the apples themselves; so that its pressure outwards was equal to 11,776 lb. and, in a cubic inch of oak, to 19,860 lb. against its sides. So that if the air was let loose at once in these substances, they would

tear every thing to pieces about them with a force superior to that of gunpowder. Hence, in eating apples, it is well that they part with the air by degrees as they are chewed and ferment in the stomach, otherwise an apple would be immediate death to him who eats it.

The mixing of some substances with others will release the air from them, all of a sudden; which may be attended with very great danger. Of this we have a remarkable instance in an experiment made by Dr Slare; who having put half a dram of oil of carraway-seeds into one glass, and a dram of compound spirit of nitre in another, covered them both on the air-pump with a receiver six inches wide and eight inches deep, and then exhausted the air, and continued pumping until all that could possibly be got both out of the receiver, and out of the two fluids, was extricated: then, by a particular contrivance from the top of the receiver, he mixed the fluids together; upon which they produced such a prodigious quantity of air as instantly blew up the receiver, although it was pressed down by the atmosphere with upwards of 400 pound weight.

P O C

Pneumonics.

PNEUMONICS, in pharmacy, medicines proper in diseases of the lungs, in which respiration is affected.

PO, a large and celebrated river of Italy, which has its source at mount Visi in Piedmont, and on the confines of Dauphiny. It runs through Piedmont, Monterrat, the Milanese, and duchy of Mantua; from thence it runs to the borders of the Parmezan, and a part of the Modenese; and having entered the Ferrarese, it begins to divide at Ficheruolo, and proceeds to discharge itself into the gulf of Venice by four principal mouths. As it passes along, it receives several rivers, and often overflows its banks, doing a great deal of mischief; the reason of which is, that most of those rivers descend from the Alps, and are increased by the melting of the snow.

POA, MEADOW-GRASS; a genus of the digynia order, belonging to the pentandria class of plants. There are 20 species; most of them grasses, and very agreeable food for cattle; for one species which grows in marshes, the cattle will frequently go so deep as to endanger their lives. This is called the *aquatica*, or *water reed-grass*. It is the largest of the British grasses, growing to the height of five or six feet. The leaves are smooth, and half an inch wide, or more. The panicle is eight or ten inches long, greatly branched, and decked with numerous spicula: these are of a reddish-brown colour intermixed with green, of a compressed lanceolate form, imbricated with about six flowers for the most part, but varying from five to ten.

POCOCK (Dr Edward), one of the most learned men in the oriental tongues in Europe, was the eldest son of the Rev. Mr Edward Pocock; and was born at Oxford in 1604, where he was also bred. In 1628, he was admitted probationer fellow of his college, and about the same time had prepared an edition of the Second Epistle of St Peter, the Second and Third of St John, and that of St Jude, in Syriac and Greek,

P O C

Pocock.

with a Latin Translation and Notes. In 1629, he was ordained priest, and appointed chaplain to the English merchants at Aleppo, where he continued five or six years; in which time he distinguished himself by his fortitude and zeal while the plague raged there. At length returning to England, he was, in 1636, appointed reader of the Arabic lectures founded by archbishop Laud. Three years after, he went to Constantinople, where he prosecuted his studies of the Eastern tongues, and procured many valuable manuscripts. After near four years stay in that city, he embarked in 1640; and taking Paris in his way, visited Gabriel Sionita the famous Maronite, and Hugo Grotius. In 1643, he was presented to the rectory of Childrey in Berks; and, about three years after, married the daughter of Thomas Burdett, Esq. About the middle of 1647, he obtained the restitution of the salary of his Arabic lecture, which had been detained from him about three years. In 1648, king Charles I. who was then prisoner in the isle of Wight, nominated Mr Pocock to the professorship of Hebrew, and the canonry of Christ-church annexed to it; but, in 1650, he was ejected from his canonry for refusing to take the engagement, and soon after a vote passed for depriving him of his Hebrew and Arabic lectures; but several governors of houses, &c. presenting a petition in his favour, he was suffered to enjoy both those places. He had some years before published his *Specimen Historie Arabum*; and now appeared his *Porta Mosis*; and soon after, the English Polyglot edition of the Bible, to which he had largely contributed, and also Euty chius's Annals, with a Latin version. At the Restoration, he was restored to the canonry of Christ-church, and also received the degree of doctor of divinity. He then published his Arabic Version of Grotius's Treatise of the Truth of the Christian Religion; and an Arabic Poem, intitled *Lamiato's Ajam*, with a Latin Translation and Notes. Soon after, he published Gregory Abul Pharasijus's *Historia Dynastiarum*.

Podolia
Poestum.

tianum. In 1674, he published an Arabic Version of the chief parts of the Liturgy of the church of England; and a few years after his Commentary on the Prophecies of Micah, Malachi, Hosea, and Joel. This great man died in 1691, after having been for many years confessedly the first person in Europe for eastern learning; and was no less worthy of admiration for his uncommon modesty and humility, and all the virtues that can adorn a Christian. His theological works were republished at London in 1740, in two volumes in folio.

PODOLIA, a province of Poland, bounded on the east by Volhinia and the river Ukraïn; on the north and north-east, by Budniac Tartary; on the south-east, by the river Niester, which separates it from Bessarabia and Moldavia in European Turkey on the south-west; and by the province of Red Russia, on the north-west. It is usually divided into the Upper and Lower: in the Upper, which is the western part, the chief town is Kamieck, the capital of Podolia, and of a palatinate. In the Lower, or eastern part of Podolia, the chief town is Brackow, the capital of a palatinate.

PODEX, in anatomy. The same with ANUS.

POEM, a poetical composition. See POETRY.

POESTUM, or POSIDONIA, an ancient city of Grecia Magna, now part of the kingdom of Naples. It has long since been in ruins, and these ruins only became known in the following manner, according to the account published by the author of the *Antiquities, History, and views, of Poestum*. "In the year 1755, an apprentice to a painter at Naples, who was on a visit to his friends at Capaccio, by accident took a walk to the mountains which surround the territory of Poestum. The only habitation he perceived was the cottage of a farmer, who cultivated the best part of the ground, and reserved the rest for pasture. The ruins of the ancient city made a part of this view, and particularly struck the eyes of the young painter; who, approaching nearer, saw with astonishment walls, towers, gates, and temples. Upon his return to Capaccio, he consulted the neighbouring people about the origin of these monuments of antiquity. He could only learn, that this part of the country had been uncultivated and abandoned during their memory; that about ten years before, the farmer, whose habitation he had noticed, established himself there; and that having dug in many places and searched among the ruins that lay round him, he had found treasures sufficient to enable him to purchase the whole. At the painter's return to Naples, he informed his master of these particulars, whose curiosity was so greatly excited by the description, that he took a journey to the place, and made drawings of the principal views. These were shown to the king of Naples, who ordered the ruins to be cleared, and Poestum arose from the obscurity in which it had remained for upwards of 700 years, as little known to the neighbouring inhabitants as to travellers."

Our author gives the following description of it in its present state. It is, says he, of an oblong figure, about two miles and a half in circumference. It has

four gates which are opposite to each other. On the key-stone of the arch of the north-gate, on the outside, is the figure of Neptune in basso relievo, and within a hippocampus. The walls which still remain are composed of very large cubical stones, and are extremely thick, in some parts 18 feet. That the walls have remained unto this time, is owing to the very exact manner in which the stones are fitted to one another, (a circumstance observed universally in the masonry of the ancients), and perhaps, in some measure, to a stalaetical concretion which has grown over them. On the walls here and there are placed towers of different heights, those near the gates being much higher and larger than the others, and evidently of modern workmanship. He observes, that, from its situation among marches, bituminous and sulphureous springs, Poestum must have been unwholesome; a circumstance mentioned by Strabo, *Morbosam eam facit fluvius in paludes diffusus*. In such a situation the water must have been bad. Hence the inhabitants were obliged to convey that necessary of life from purer springs by means of aqueducts, of which many vestiges still remain.

The principal monuments of antiquity are a theatre, an amphitheatre, and three temples. The theatres and amphitheatres are much ruined. The first temple is hexastylos, and amphiprotylos. At one end, the pilasters and two columns which divided the cella from the pronaos are still remaining. Within the cella are two rows of smaller columns, with an architrave, which support the second order. This temple he takes to be of that kind called by Vitruvius *hypæthrae*, and supports his opinion by a quotation from that author. The second temple is also amphiprotylos: it has nine columns in front and 18 in flank, and seems to be of that kind called by Vitruvius *pseudodipteros*. The third is likewise amphiprotylos. It has six columns in front and 13 in flank. Vitruvius calls this kind of temple *peripteros*. "The columns of these temples (says our author), are of that kind of Doric order which we find employed in works of the greatest antiquity. They are hardly five diameters in height. They are without bases, which also has been urged as a proof of their antiquity; but we do not find that the ancients ever used bases to this order, at least till very late. Vitruvius makes no mention of bases for this order: and the only instance we have of it, is in the first order of the coliseum at Rome, which was built by Vespasian. The pillars of these temples are fluted with very shallow flutings in the manner described by Vitruvius. The columns diminish from the bottom, which was the most ancient method almost universally in all the orders. The columns have astragals of a very singular form; which shows the error of those who imagine that this member was first invented with the Ionic order, to which the Greeks gave an astragal, and that the Romans were the first who applied it to the Doric. The echinus of the capital is of the same form with that of the temple of Corinth described by Le Roy."

POET, the author of a poem. See the next article.

POETRY.

Poestum,
Poet.

Fig 1. PROCELLARIA Pelagica
or Petrel



Plat. CCXI. Ill.

Fig 2.
PINNA.



Fig 8.

Fig 9.

Fig 20.

Fig 14.

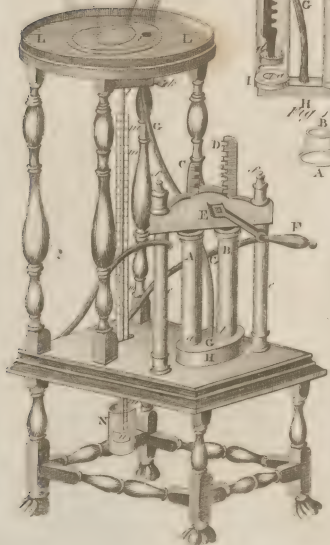
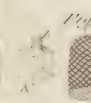
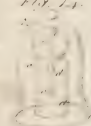
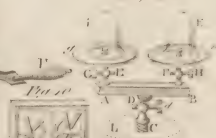
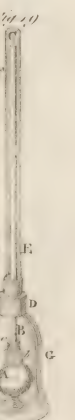


Fig 18.



W. H. L.



P O E T R Y.

¹ AMIDST those thick clouds which envelope the first ages of the world, reason and history throw some lights on the origin and primitive employment of this divine art. Reason suggests, that before the invention of letters, all the people of the earth had no other method of transmitting to their descendants the principles of their worship, their religious ceremonies, their laws, and the renowned actions of their sages and heroes, than by poetry; which included all these objects in a kind of hymns that fathers sung to their children, in order to engrave them with indelible strokes in their hearts. History not only informs us, that Moses and Miriam, the first authors that are known to mankind, sung, on the borders of the Red Sea, a song of divine praise, to celebrate the deliverance which the Almighty had vouchsafed to the people of Israel, by opening a passage to them through the waters; but it has also transmitted to us the song itself, which is at once the most ancient monument and a master-piece of poetic composition.

2. The Greeks, a people the most ingenious, the most animated, and in every sense the most accomplished, that the world ever produced—drove to ravish from the Hebrews the precious gift of poetry, which was vouchsafed them by the Supreme Author of all nature, that they might ascribe it to their false deities. According to their ingenious fictions, Apollo became the god of poetry, and dwelt on the hills of Phocis, Parnassus, and Helicon, whose feet were washed by the waters of Hyppocrene, of which each mortal that ever drank was seized with a sacred delirium. The immortal swans floated on its waves. Apollo was accompanied by the Muses—those nine learned sisters—the daughters of Memory: and he was constantly attended by the Graces. Pegasus, his winged courser, transported him with a rapid flight into all the regions of the universe. Happy emblems! by which we at this day embellish our poetry, as no one has ever yet been able to invent more brilliant images.

3. The literary annals of all nations afford vestiges of poetry, from the remotest ages. They are found among the most savage of the ancient barbarians, and the most desolate of all the Americans. Nature asserts her rights in every country, and every age. Tacitus mentions the verses and the hymns of the Germans, at the time when that rough people yet inhabited the woods, and while their manners were still savage. The first inhabitants of Runnia, and the other northern countries, those of Gaul, Albion, Iberia, Aulonia, and other nations of Europe, had their poetry, as well as the ancient people of Asia, and of the known borders of Africa. But the simple productions of nature have constantly something unformed, rough, and savage. The Divine Wisdom appears to have placed the ingenious and polished part of mankind on the earth, in order to refine that which comes from her bosom rude and imperfect: and thus art has polished poetry, which issued quite naked and savage from the brains of the first of mankind.

4. But what is Poetry? It would be to abridge the

limits of the poetic empire, to contract the sphere of this divine art, should we say, in imitation of all the dictionaries and other treatises on versification, *That poetry is the art of making verses, of lines or periods that are in rhyme or metre.* This is rather a grammatical explanation of the word, than a real definition of the thing, and it would be to degrade poetry thus to define it. The justest definition seems to be that given by Baron Biehsfeld †, *That poetry is the art of expressing our thoughts by fiction.* In fact, it is after this manner (if we reflect with attention) that all the metaphors and allegories, all the various kinds of fiction, form the first materials of a poetic edifice: it is thus that all images, all comparisons, illusions, and figures, especially those which personify moral subjects, as virtues and vices, concur to the decorating of such a structure. A work, therefore, that is filled with invention, that incessantly presents images which render the reader attentive and affected, where the author gives interesting sentiments to every thing that he makes speak, and where he makes speak by sensible figures all those objects which would affect the mind but weakly when clothed in a simple prosaic style, such a work is a poem. While that, though it be in verse, which is of a didactic, dogmatic, or moral nature, and where the objects are presented in a manner quite simple, without fiction, without images or ornaments, cannot be called *poetry*, but merely a work in verse; for the art of reducing thoughts, maxims, and periods, into rhyme or metre, is very different from the art of poetry.

6. An ingenious fable, a lively and interesting romance, a comedy, the sublime narrative of the actions of a hero, such as the Telemachus of M. Fenelon, though written in prose, but in measured prose, is therefore a work of poetry: because the foundation and the superstructure are the productions of genius, as the whole proceeds from fiction; and truth itself appears to have employed an innocent and agreeable deception to instruct with efficacy. This is so true, that the pencil also, in order to please and affect, has recourse to fiction; and this part of painting is called the *poetic composition of a picture*. It is therefore by the aid of fiction that poetry, so to speak, paints its expressions, that it gives a body and a mind to its thoughts, that it animates and exalts that which would otherwise have remained arid and insensible. Every work, therefore, where the thoughts are expressed by fictions or images, is poetic; and every work where they are expressed naturally, simply, and without ornament, although it be in verse, is prosaic.

7. Verse, however, is not to be regarded as foreign or superfluous to poetry. To reduce those images, those fictions, into verse, is one of the greatest difficulties in poetry, and one of the greatest merits in a poem: and for these reasons, the cadence, the harmony of sounds, particularly that of rhyme, delight the ear to a high degree, and the mind insensibly repeats them while the eye reads them. There results therefore a

plea-

pleasure to the mind, and a strong attachment to these ornaments: but this pleasure would be frivolous, and even childish, if it were not attended by a real utility. Verses were invented in the first ages of the world, merely to aid and to strengthen the memory: for cadence, harmony, and especially rhyme, afford the greatest assistance to the memory that art can invent; and the images, or poetic fictions, that strike our senses, assist in graving them with such deep traces in our minds, as even time itself frequently cannot efface. How many ex-

cellent apophthegms, sentences, maxims, and precepts, would have been buried in the abyss of oblivion, if poetry had not preserved them by its harmony? To give more efficacy to this lively impression, the first poets sung their verses, and the words and phrases must necessarily have been reduced, at least to cadence, or they could not have been susceptible of musical expression. One of the great excellencies, therefore, though not a necessary constituent, of poetry, consists in its being expressed in verse. See Part III.

PART I. GENERAL PRINCIPLES OF THE ART.

SECT. I. Of the Essence and End of Poetry.

8. UNDER the article *Polite Arts*, it was observed, that the *essence* of these in general, and consequently of poetry in particular, consists in *expression*: and we think, that, to be poetic, the expression must necessarily arise from *fiction*, or invention *. This invention, which is the fruit of happy genius alone, arises, 1. From the subject itself of which we undertake to treat: 2. From the manner in which we treat that subject, or the species of writing of which we make use: 3. From the plan that we propose to follow in conformity to this manner; and, 4. From the method of executing this plan in its full detail. Our first guides, the ancients, afford us no lights that can elucidate all these objects in general. The precepts which Aristotle lays down, relate to epic and dramatic poetry only: and which, by the way, confirms our idea, that antiquity itself made the essence of poetry to consist in fiction, and not in that species of verse which is destitute of it, or in that which is not capable of it. But since this art has arrived to a great degree of perfection; and as poetry, like electricity, communicates its fire to every thing it touches, and animates and embellishes whatever it treats; there seems to be no subject in the universe to which poetry cannot be applied, and that it cannot render equally brilliant and pleasing. From this universality of poetry, from its peculiar property of expression by fiction, which is applicable to all subjects, have arisen its different species, of which a particular description will be given in the second part.

9. Horace, in a well-known verse, has been supposed to declare the end of poetry to be twofold, to please, or to instruct:

Aut prolesse volunt, aut docere poeta.

But Dr Beattie † maintains, that the ultimate end of this art is to please; instruction being only one of the means (and not always a necessary one) by which that ultimate end is to be accomplished. The passage, rightly understood, he observes, will not appear to contain any thing inconsistent with this doctrine. The author is there stating a comparison between the Greek and Roman writers, with a view to the poetry of the stage; and, after commending the former for their correctness, and for the liberal spirit wherewith they conducted their literary labours, and blaming his countrymen for their inaccuracy and avarice, he proceeds thus: "The ends proposed by our dramatic poets (or by poets in general) are, to please, to instruct, or to do both. When instruction is your aim,

let your moral sentences be expressed with brevity, that they may be readily understood, and long remembered: where you mean to please, let your fictions be conformable to truth, or probability. The elder part of your audience (or readers) have no relish for poems that give pleasure only without instruction; nor the younger for such writings as give instruction without pleasure. He only can secure the universal suffrage in his favour, who blends the useful with the agreeable, and delights at the same time that he instructs the reader. Such are the works that bring money to the bookseller, that pass into foreign countries, and perpetuate the author's name thro' a long succession of ages ‡."—Now, what is the meaning of all this? What, but that to the *perfection* of dramatic poetry (or, if you please, of poetry in general) both sound morals and beautiful fiction are requisite? But Horace never meant to say, that instruction, as well as pleasure, is necessary to give to any composition the *poetical character*: or he would not in another place have celebrated, with so much affection and rapture, the melting strains of Sappho, and the playful genius of Anacreon §,—two authors transcendently sweet, but not remarkably instructive. We are sure, that pathos, and harmony, and elevated language, were, in Horace's opinion, essential to poetry ¶; and of these decorations nobody will affirm that instruction is the end, who considers that the most instructive books in the world are written in plain prose.

In short, our author has endeavoured by many ingenious arguments and illustrations to establish it as a truth in criticism, that the end of poetry is to please. Verses, if pleasing, may be poetical, though they convey little or no instruction; but verses, whose sole merit it is that they convey instruction, are not poetical. Instruction, however, he admits, especially in poems of length, is necessary to their *perfection*, because they would not be perfectly agreeable without it.

SECT. II. Of the Standard of Poetical Invention.

10. HOMER's beautiful description of the heavens and earth, as they appear in a calm evening by the light of the moon and stars, concludes with this circumstance, "And the heart of the shepherd is glad *." † *Ihad, b. 8.* Madame Dacier, from the turn she gives to the passage in her version, seems to think, and Pope, in order perhaps to make out his couplet, insinuates, that the gladness of the shepherd is owing to his sense of the utility of those luminaries. And this may in part

* See ARTS
(Polite),
no 7.

† *Essays on
Poetry and
Music*,
Part I.
chap. i.

† *Hor. Ar.
Poc. 333.*
347.

† *Hor. Carm.
lib. 4. ode 9.*

§ *Hor. Sat.
lib. 1. sat. 4.*
vers. 40.

† *Ihad, b. 8.*

† *Ihad, b. 8.*

† *Ihad, b. 8.*

† *Ihad, b. 8.*

† *Ihad, b. 8.*

† *Ihad, b. 8.*

Of
vention.Of
Invention.Gentle's
Jays,
Part I.
chap. ii.

be the case: but this is not in Homer; nor is it a necessary consideration. It is true, that, in contemplating the material universe, they who discern the causes and effects of things must be more rapturously entertained, than those who perceive nothing but shape and size, colour and motion. Yet, in the mere outside of nature's works, there is a splendor and a magnificence to which even untutored minds cannot attend, without great delight.

Not that all peasants, or all philosophers, are equally susceptible of these charming impressions. It is strange to observe the callousness of some men, before whom all the glories of heaven and earth pass in daily succession, without touching their hearts, elevating their fancy, or leaving any durable remembrance. Even of those who pretend to sensibility, how many are there to whom the lustre of the rising or setting sun; the sparkling concave of the midnight-sky; the mountain-forest tossing and roaring to the storm, or warbling with all the melodies of a summer evening; the sweet interchange of hill and dale, shade and sunshine, grove, lawn, and water, which an extensive landscape offers to the view; the scenery of the ocean, so lovely, so majestic, and so tremendous; and the many pleasing varieties of the animal and vegetable kingdom, could never afford so much real satisfaction, as the steams and noise of a ball-room, the insipid fiddling and squeaking of an opera, or the vexations and wranglings of a card-table!

But some minds there are of a different make; who, even in the early part of life, receive from the contemplation of Nature a species of delight which they would hardly exchange for any other; and who, as avarice and ambition are not the infirmities of that period, would, with equal sincerity and rapture, exclaim,

I care not, Fortune, what you me deny;
You cannot rob me of free Nature's grace;
You cannot shut the windows of the sky,
Through which Aurora shows her brightening face;
You cannot bar my constant feet to trace
The woods and lawns by living stream at eve.

Castle of Indolence.

Such minds have always in them the seeds of true taste, and frequently of imitative genius. At least, tho' their enthusiastic or visionary turn of mind (as the man of the world would call it) should not always incline them to practise poetry or painting, we need not scruple to affirm, that without some portion of this enthusiasm no person ever became a true poet or painter. For he who would imitate the works of Nature, must first accurately observe them; and accurate observation is to be expected from those only who take great pleasure in it.

To a mind thus disposed no part of creation is indifferent. In the crowded city, and howling wilderness; in the cultivated province, and solitary isle; in the flowery lawn, and craggy mountain; in the murmur of the rivulet, and in the uproar of the ocean; in the radiance of summer, and gloom of winter; in the thunder of heaven, and in the whisper of the breeze; he still finds something to rouse or to soothe his imagination, to draw forth his affections, or to employ his understanding. And from every mental energy that is

not attended with pain, and even from some of those that are, as moderate terror and pity, a sound mind derives satisfaction; exercise being equally necessary to the body and the soul, and to both equally productive of health and pleasure.

This happy sensibility to the beauties of Nature should be cherished in young persons. It engages them to contemplate the Creator in his wonderful works; it purifies and harmonizes the soul, and prepares it for moral and intellectual discipline; it supplies an endless source of amusement; it contributes even to bodily health: and, as a strict analogy subsists between material and moral beauty, it leads the heart by an easy transition from the one to the other; and thus recommends virtue for its transcendent loveliness, and makes vice appear the object of contempt and abomination. An intimate acquaintance with the best descriptive poets, Spenser, Milton, and Thomson, but above all with the divine Georgic, joined to some practice in the art of drawing, will promote this amiable sensibility in early years: for then the face of Nature has novelty superadded to its other charms, the passions are not pre-engaged, the heart is free from care, and the imagination warm and romantic.

But, not to insist longer on those ardent emotions that are peculiar to the enthusiastic disciple of Nature, may it not be affirmed of all men, without exception, or at least of all the enlightened part of mankind, that they are gratified by the contemplation of things natural, as opposed to unnatural? monstrous fights please but for a moment, if they please at all; for they derive their charm from the beholder's amazement, which is quickly over. We read indeed of a man of rank in Sicily †, who chooses to adorn his villa with pictures and statues of most unnatural deformity: but it is a singular instance; and one would not be much more surprised to hear of a person living without food, or growing fat by the use of poison. To say of any thing, that it is *contrary to nature*, denotes censure and disgust on the part of the speaker; as the epithet *natural* intimates an agreeable quality, and seems for the most part to imply, that a thing is as it ought to be, suitable to our own taste, and congenial with our own constitution. Think, with what sentiments we should peruse a poem, in which Nature was totally misrepresented, and principles of thought and of operation supposed to take place, repugnant to every thing we had seen or heard of:—in which, for example, avarice and coldness were ascribed to youth, and prodigality and passionate attachment to the old; in which men were made to act at random, sometimes according to character, and sometimes contrary to it; in which cruelty and envy were productive of love, and beneficence and kind affection of hatred; in which beauty was invariably the object of dislike, and ugliness of desire; in which society was rendered happy by atheism and the promiscuous perpetration of crimes, and justice and fortitude were held in universal contempt. Or think, how we should relish a painting, where no regard was had to the proportions, colours, or any of the physical laws, of Nature:—where the ears and eyes of animals were placed in their shoulders; where the sky was green, and the grass crimson; where trees grew with their branches in the earth, and their roots in the air; where men

† Brydone's
Tour in Sicily, let. 24.

were seen fighting after their heads were cut off, ships sailing on the land, lions entangled in cobwebs, sheep preying on dead carcasses, fishes sporting in the woods, and elephants walking on the sea. Could such figures and combinations give pleasure, or merit the appellation of sublime or beautiful? Should we hesitate to pronounce their author mad? And are the absurdities of madmen proper subjects either of amusement or of imitation to reasonable beings?

Let it be remarked too, that though we distinguish our internal powers by different names, because otherwise we could not speak of them so as to be understood, they are all but so many energies of the same individual mind; and therefore it is not to be supposed, that what contradicts any one leading faculty should yield permanent delight to the rest. That cannot be agreeable to reason, which conscience disapproves; nor can that gratify imagination, which is repugnant to reason.—Besides, belief and acquiescence of mind are pleasant, as distrust and disbelief are painful: and therefore, that only can give solid and general satisfaction, which has something of plausibility in it; something which we conceive it possible for a rational being to believe. But no rational being can acquiesce in what is obviously contrary to nature, or implies palpable absurdity.

Poetry, therefore, and indeed every art whose end is to please, must be natural; and if so, must exhibit real matter of fact, or something like it; that is, in other words, must be, either according to truth, or according to verisimilitude.

And though every part of the material universe abounds in objects of pleasurable contemplation, yet nothing in nature so powerfully touches our hearts, or gives so great variety of exercise to our moral and intellectual faculties, as man. Human affairs and human feelings are universally interesting. There are many who have no great relish for the poetry that delineates only irrational or inanimate beings; but to that which exhibits the fortunes, the characters, and the conduct of men, there is hardly any person who does not listen with sympathy and delight. And hence, to imitate human action, is considered by Aristotle as essential to this art; and must be allowed to be essential to the most pleasing and most instructive part of it, Epic and Dramatic composition. Mere descriptions, however beautiful, and moral reflections, however just, become tiresome, where our passions are not occasionally awakened by some event that concerns our fellow-men. Do not all readers of taste receive peculiar pleasure from those little tales or episodes with which Thomson's descriptive poem on the Seasons is here and there enlivened? and are they not sensible, that the thunder-storm would not have been half so interesting without the tale of the two lovers, (*Summer*, v. 1171); nor the harvest-scene, without that of Palemon and Lavinia, (*Aut.* v. 177.); nor the driving snows, without that exquisite picture of a man perishing among them, (*Winter*, v. 276.)? It is much to be regretted, that Young did not employ the same artifice to animate his Night-Thoughts. Sentiments and descriptions may be regarded as the pilasters, carvings, gildings, and other decorations of the poetical fabric; but human actions are the columns and the rafters, that give it stability and elevation. Or,

changing the metaphor, we may consider these as the soul which informs the lovely frame; while those are little more than the ornaments of the body.

Whether the pleasure we take in things natural, and our dislike to what is the reverse, be the effect of habit or of constitution, is not a material inquiry. There is nothing absurd in supposing, that between the soul, in its first formation, and the rest of nature, a mutual harmony and sympathy may have been established, which experience may indeed confirm, but no perverse habits could entirely subdue. As no sort of education could make man believe the contrary of a self-evident axiom, or reconcile him to a life of perfect solitude; so we should imagine, that our love of nature and regularity might still remain with us in some degree, though we had been born and bred in the Sicilian villa above-mentioned, and never heard any thing applauded but what deserved censure, nor censured but what merited applause. Yet habit must be allowed to have a powerful influence over the sentiments and feelings of mankind. Objects to which we have been long accustomed, we are apt to contract a fondness for; we conceive them readily, and contemplate them with pleasure; nor do we quit our old tracts of speculation or practice, without reluctance and pain. Hence in part arises our attachment to our own professions, our old acquaintances, our native soil, our homes, and to the very hills, streams, and rocks in our neighbourhood. It would therefore be strange, if man, accustomed as he is from his earliest days to the regularity of nature, did not contract a liking to her productions, and principles of operation.

Yet we neither expect nor desire, that every human invention, where the end is only to please, should be an exact transcript of real existence. It is enough, that the mind acquiesce in it as probable, or plausible, or such as we think might happen without any direct opposition to the laws of Nature:—Or, to speak more accurately, it is enough, that it be consistent, either, first, with general experience; or, secondly, with popular opinion; or, thirdly, that it be consistent with itself, and connected with probable circumstances.

First: If a human invention be consistent with general experience, we acquiesce in it as sufficiently probable. Particular experiences, however, there may be, so uncommon and so little expected, that we should not admit their probability, if we did not know them to be true. No man of sense believes, that he has any likelihood of being enriched by the discovery of hidden treasure; or thinks it probable, on purchasing a lottery-ticket, that he shall gain the first prize; and yet great wealth has actually been acquired by such good fortune. But we should look upon these as poor expedients in a play or romance for bringing about a happy catastrophe. We expect that fiction should be more consonant to the general tenor of human affairs; in a word, that not possibility, but probability, should be the standard of poetical invention.

Secondly: Fiction is admitted as conformable to this standard, when it accords with received opinions. These may be erroneous, but are not often apparently repugnant to nature. On this account, and because they are familiar to us from our infancy, the mind readily

Of
Invention.

readily acquiesces in them, or at least yields them that degree of credit which is necessary to render them pleasing. Hence the fairies, ghosts, and witches of Shakespeare, are admitted as probable beings; and angels obtain a place in religious pictures, though we know that they do not now appear in the scenery of real life. Even when a popular opinion has long been exploded, and has become repugnant to universal belief, the fictions built upon it are still admitted as natural, because they were accounted such by the people to whom they were first addressed; whose sentiments and views of things we are willing to adopt, when, by the power of pleasing description, we are introduced into their scenes, and made acquainted with their manners. Hence we admit the theology of the ancient poets, their Elysium and Tartarus, Scylla and Charybdis, Cyclops and Circe, and the rest of those "beautiful wonders" (as Horace calls them) which were believed in the heroic ages; as well as the demons and enchantments of Tasso, which may be supposed to have obtained no small degree of credit among the Italians of the 16th century, and are suitable enough to the notions that prevailed universally in Europe not long before (A). In fact, when poetry is in other respects true; when it gives an accurate display of those parts of nature about which we know that men in all ages must have entertained the same opinion, namely, those appearances in the visible creation, and those feelings and workings of the human mind, which are obvious to all mankind;—when poetry is thus far according to nature, we are very willing to be indulgent to what is fictitious in it, and to grant a temporary allowance to any system of fable which the author pleases to adopt; provided that he lay the scene in a distant country, or fix the date to a remote period. This is no unreasonable piece of complaisance: we owe it both to the poet and to ourselves; for without it we should neither form a right estimate of his genius, nor receive from his works that pleasure which they were intended to impart. Let him, however, take care, that his system of fable be such as his countrymen and cotemporaries (to whom his work is immediately addressed) might be supposed capable of yielding their assent to; for otherwise we should not believe him to be in earnest: and let him connect it as much as he can with probable circumstances, and make it appear in a series of events consistent with itself.

For (thirdly) if this be the case, we shall admit his story as probable, or at least as natural, and consequently be interested in it, even though it be not warranted by general experience, and derive but slender authority from popular opinion. Caliban, in the *Tempest*, would have shocked the mind as an improbability, if we had not been made acquainted with his origin, and seen his character displayed in a series of consistent behaviour. But when we are told that he sprang from a witch and a demon, a connection not contrary to the laws of nature, as they were under-

flood in Shakespeare's time, and find his manners conformable to his descent, we are easily reconciled to the fiction. In the same sense, the Lilliputians of Swift may pass for probable beings; not so much because we know that a belief in pygmies was once current in the world, (for the true ancient pygmy was at least thrice as tall as those whom Gulliver visited), but because we find that every circumstance relating to them accords with itself, and with their supposed character. It is not the size of the people only that is diminutive; their country, seas, ships, and towns, are all in exact proportion; their theological and political principles, their passions, manners, customs, and all the parts of their conduct, betray a levity and littleness perfectly suitable: and so simple is the whole narration, and apparently so artless and sincere, that we should not much wonder if it had imposed (as we have been told it has) upon some persons of no contemptible understanding. The same degree of credit may perhaps, for the same reasons, be due to his giants. But when he grounds his narrative upon a contradiction to nature; when he presents us with rational brutes, and irrational men; when he tells us of horses building houses for habitation, milking cows for food, riding in carriages, and holding conversations on the laws and politics of Europe; not all his genius (and he there exerts it to the utmost) is able to reconcile us to so monstrous a fiction: we may smile at some of his absurd exaggerations; we may be pleased with the energy of style, and accuracy of description, in particular places; and a malevolent heart may triumph in the satire; but we can never relish it as a fable, because it is at once unnatural and self-contradictory. Swift's judgment seems to have forsaken him on this occasion: he wallows in naïveté and brutality; and the general run of his satire is downright defamation. Lucian's *True History* is a heap of extravagancies put together without order or unity, or any other apparent design than to ridicule the language and manner of grave authors. His ravings, which have no better right to the name of *Fable*, than a hill of rubbish has to that of palace, are destitute of every colour of plausibility. Animal trees, ships sailing in the sky, armies of monstrous things travelling between the sun and moon on a pavement of cobwebs, rival nations of men inhabiting woods and mountains in a whale's belly,—are liker the dreams of a bedlamite than the inventions of a rational being.

If we were to prosecute this subject any further, it would be proper to remark, that in some kinds of poetical invention a stricter probability is required than in others:—that, for instance, Comedy, whether dramatic or narrative (B), must seldom deviate from the ordinary course of human affairs, because it exhibits the manners of real, and even of familiar life:—that the tragic poet, because he imitates characters more exalted, and generally refers to events little known, or long since past, may be allowed a wider range; but must never attempt the marvellous fictions of the epic muse,

Scottie's
Ejpyi,
ut supra.

(A) In the 14th century, the common people of Italy believed, that the poet Dante went down to hell; that the *Inferno* was a true account of what he saw there; and that his fallow complexion, and stunted beard, (which seemed by its growth and colour to have been too near the fire), where the consequence of his passing so much of his time in that hot and smoky region. See *Vicende della letteratura del Sig. G. Denina, cap. 4.*

(B) Fielding's *Tom Jones*, *Amelia*, and *Joseph Andrews*, are examples of what may be called the *Epic* or *Narrative Comedy*, or more properly, perhaps, the *Comic Epopee*.

muse, because he addresses his work, not only to the passions and imagination of mankind, but also to their eyes and ears, which are not easily imposed on, and refuse to be gratified with any representation that does not come very near the truth :—that the epic poem may claim still ampler privileges, because its fictions are not subject to the scrutiny of any outward sense, and because it conveys information in regard both to the highest human characters, and the most important and wonderful events, and also to the affairs of unseen worlds and superior beings. Nor would it be improper to observe, that the several species of comic, of tragic, of epic composition, are not confined to the same degree of probability ; for that farce may be allowed to be less probable than the regular comedy ; the masque than the regular tragedy ; and the mixed epic, such as the *Fairy Queen*, or *Orlando Furioso*, than the pure epopee of *Homer*, *Virgil*, and *Milton*. But this part of the subject seems not to require further illustration. Enough has been said to show, that nothing unnatural can please ; and that therefore poetry, whose end is to please, must be according to nature.

And if so, it must be, either according to real nature, or according to nature somewhat different from the reality.

SECT. III. *Of the System of Nature exhibited by Poetry.*

11. To exhibit *real nature* is the business of the historian ; who, if he were strictly to confine himself to his own sphere, would never record even the minutest circumstance of any speech, event, or description, which was not warranted by sufficient authority. It has been the language of critics in every age, that the historian ought to relate nothing as true which is false or dubious, and to conceal nothing material which he knows to be true. But it is to be doubted whether any writer of profane history has ever been so scrupulous. *Thucydides* himself, who began his history when that war began which he records, and who set down every event soon after it happened, according to the most authentic information, seems, however, to have indulged his fancy not a little in his harangues and descriptions, particularly that of the plague of Athens : and the same thing has been practised, with greater latitude, by *Livy* and *Tacitus*, and more or less by all the best historians both ancient and modern. Nor are they to be blamed for it. By these improved or invented speeches, and by the heightenings thus given to their descriptions, their work becomes more interesting, and more useful ; nobody is deceived, and historical truth is not materially affected. A medium is, however, to be observed in this, as in other things. When the historian lengthens a description into a detail of fictitious events, as *Voltaire* has done in his account of the battle of *Fontenoy*, he loses his credit with us, by raising a suspicion that he is more intent upon a pretty story, than upon the truth. And we are disgusted with his insincerity, when, in defiance even of verisimilitude, he puts long elaborate orations in the mouth of those, of whom we know, either from the circumstances that they could not, or from more authentic records that they did not, make any such orations ; as *Dionysius* of *Halicarnassus* has done in

the case of *Volumnia* haranguing her son *Coriolanus*, and *Flavius Josephus* in that of *Judah* addressing his brother as viceroy of Egypt. From what these historians relate, one would conjecture, that the Roman matron had studied at Athens under some long-winded rhetorician, and that the Jewish patriarch must have been one of the most flowery orators of antiquity. But the fictitious part of history, or of story-telling, ought never to take up much room ; and must be highly blameable when it leads into any mistake either of facts or of characters.

Now, why do historians take the liberty to embellish their works in this manner ? One reason, no doubt, is, that they may display their talents in oratory and narration : but the chief reason, as hinted already, is, to render their composition more agreeable. It would seem, then, that something more pleasing than real nature, or something which shall add to the pleasing qualities of real nature, may be devised by human fancy. And this may certainly be done. And this it is the poet's business to do. And when this is in any degree done by the historian, his narrative becomes in that degree poetical.

The possibility of thus improving upon nature must be obvious to every one. When we look at a landscape, we can fancy a thousand additional embellishments. Mountains loftier and more picturesque ; rivers more copious, more limpid, and more beautifully winding ; smoother and wider lawns ; valleys more richly diversified ; caverns and rocks more gloomy and more stupendous ; ruins more majestic ; buildings more magnificent ; oceans more varied with islands, more splendid with shipping, or more agitated by storm, than any we have ever seen, it is easy for human imagination to conceive. Many things in art and nature exceed expectation ; but nothing sensible transends, or equals, the capacity of thought :—a striking evidence of the dignity of the human soul ! The finest woman in the world appears to every eye susceptible of improvement, except perhaps to that of her lover. No wonder, then, if in poetry events can be exhibited more compact, and of more pleasing variety, than those delineated by the historian, and scenes of inanimate nature more dreadful or more lovely, and human characters more sublime and more exquisite, both in good and evil. Yet still let nature supply the ground-work and materials, as well as the standard, of poetical fiction. The most expert painters use a layman, or other visible figure, to direct their hand and regulate their fancy. *Homer* himself founds his two poems on authentic tradition ; and tragic as well as epic poets have followed the example. The writers of romance, too, are ambitious to interweave true adventures with their fables ; and when it can be conveniently done, to take the outlines of their plan from real life. Thus the tale of *Robinson Crusoe* is founded on an incident that actually befel one *Alexander Selkirk*, a sea-faring man, who lived several years alone in the island of *Juan Fernandes* ; *Smollet* is thought to have given us several of his own adventures in the history of *Roderic Random* ; and the chief characters in *Tom Jones*, *Joseph Andrews*, and *Pamela*, are said to have been copied from real originals.—Dramatic comedy, indeed, is for the most part purely fictitious : for if it were to exhibit real events

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* Compare
Hor. lib. 1.
sat. 4. ver.
1.—5. with
Ar. Poet.
verf. 281.—
285.

as well as present manners, it would become too personal to be endured by a well-bred audience, and degenerate into downright abuse; which appears to have been the case with the old comedy of the Greeks *. But in general, hints taken from real existence will be found to give no little grace and stability to fiction, even in the most fanciful poems. Those hints, however, may be improved by the poet's imagination, and set off with every probable ornament that can be devised, consistently with the design and genius of the work;—or, in other words, with the sympathies that the poet means to awaken in the mind of his reader. For mere poetical ornament, when it fails to interest the affections, is not only useless but improper; all true poetry being addressed to the heart, and intended to give pleasure by raising or soothing the passions;—the only effectual way of pleasing a rational and moral creature. And therefore we would take Horace's maxim to be universal in poetry: "*Non satis est, pulchra esse poemata; dulcia suntu*" "It is not enough that poems be beautiful; let them also be affecting."—For that this is the meaning of the word *dulcia* in this place, is admitted by the best interpreters, and is indeed evident from the context †.

† Hor. Ar.
Poet. ver.
95.—100.

That the sentiments and feelings of percipient beings, when expressed in poetry, should call forth our affections, is natural enough; but can descriptions of inanimate things also be made affecting? Certainly they can: and the more they affect, the more they please us, and the more poetical we allow them to be. Virgil's *Georgic* is a noble specimen (and indeed the noblest in the world) of this sort of poetry. His admiration of external nature gains upon a reader of taste, till it rises to perfect enthusiasm. The following observations will perhaps explain this matter.

Every thing in nature is complex in itself, and bears innumerable relations to other things; and may therefore be viewed in an endless variety of lights, and consequently described in an endless variety of ways. Some descriptions are good, and others bad. An historical description, that enumerates all the qualities of any object, is certainly good, because it is true; but may be as uninteresting as a logical definition. In poetry, no uninteresting description is good, however conformable to truth; for here we expect not a complete enumeration of qualities, (the chief end of the art being to please), but only such an enumeration as may give a lively and interesting idea. It is not memory, or the knowledge of rules, that can qualify a poet for this sort of description; but a peculiar liveliness of fancy and sensibility of heart, the nature whereof we may explain by its effects, but we cannot lay down rules for the attainment of it.

When our mind is occupied by any emotion, we naturally use words and meditate on things that are suitable to it and tend to encourage it. If a man were to write a letter when he is very angry, there would probably be something of vehemence or bitterness in the style, even though the person to whom he wrote were not the object of his anger. The same thing holds true of every other strong passion or emotion:—while it predominates in the mind, it gives a

peculiarity to our thoughts; as well as to our voice, gesture, and countenance: And hence we expect, that every personage introduced in poetry should see things through the medium of his ruling passion, and that his thoughts and language should be tinged accordingly. A melancholy man walking in a grove, attends to those things that suit and encourage his melancholy; the sighing of the wind in the trees, the murmuring of waters, the darkness and solitude of the shades: A cheerful man in the same place, finds many subjects of cheerful meditation, in the singing of birds, the brisk motions of the babbling stream, and the liveliness and variety of the verdure. Persons of different characters, contemplating the same thing, a Roman triumph, for instance, feel different emotions, and turn their view to different objects. One is filled with wonder at such a display of wealth and power; another exults in the idea of conquest, and pants for military renown; a third, stunned with clamour, and harassed with confusion, wishes for silence, security, and solitude; one melts with pity to the vanquished, and makes many a sad reflection upon the insignificance of worldly grandeur, and the uncertainty of human things; while the buffoon, and perhaps the philosopher, considers the whole as a vain piece of pageantry, which, by its solemn procedure, and by the admiration of so many people, is only rendered the more ridiculous:—and each of these persons would describe it in a way suitable to his own feelings, and tending to raise the same in others. We see in Milton's *Allegro* and *Penitente*, how a different cast of mind produces a variety in the manner of conceiving and contemplating the same rural scenery. In the former of these excellent poems, the author personates a cheerful man, and takes notice of those things in external nature that are suitable to cheerful thoughts, and tend to encourage them: in the latter, every object described is serious and solemn, and productive of calm reflection and tender melancholy: and we should not be easily persuaded, that Milton wrote the first under the influence of sorrow, or the second under that of gladness. We often see an author's character in his works; and if every author were in earnest when he writes, we should often see it. Thomson was a man of piety and benevolence, and a warm admirer of the beauties of nature; and every description in his delightful poem on the *Seasons* tends to raise the same laudable affections in his reader. The parts of nature that attract his notice are those which an impious or hard-hearted man would neither attend to, nor be affected with, at least in the same manner. In Swift we see a turn of mind very different from that of the amiable Thomson; little relish for the sublime or beautiful, and a perpetual succession of violent emotions. All his pictures of human life seem to show, that deformity and mean-ness were the favourite objects of his attention, and that his soul was a constant prey to indignation (c), disgust, and other gloomy passions, arising from such a view of things. And it is the tendency of almost all his writings, (though it was not always the author's design), to communicate the same passions to his reader: inasmuch, that notwithstanding his erudition and

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(c) For part of this remark we have his own authority, often in his letters, and very explicitly in the Latin epigraph which he composed for himself:—"ubi fæva indignatio ulterius cor lacerare nequit." See his *last will and testament*.

knowledge of the world, his abilities as a popular orator and man of business, the energy of his style, the elegance of some of his verses, and his extraordinary talents in wit and humour, there is reason to doubt, whether by studying his works any person was ever much improved in piety or benevolence.

And thus we see, how the compositions of an ingenious author may operate upon the heart, whatever be the subject. The affections that prevail in the author himself direct his attention to objects congenial, and give a peculiar bias to his inventive powers, and a peculiar colour to his language. Hence his work, as well as face, if nature is permitted to exert herself freely in it, will exhibit a picture of his mind, and awaken correspondent sympathies in the reader. When these are favourable to virtue, which they always ought to be, the work will have that sweet pathos which Horace alludes in the passage above mentioned; and which we so highly admire, and so warmly approve, even in those parts of the *Georgic* that describe inanimate nature.

Horace's account of the matter in question differs not from what is here given. "It is not enough (says he) that poems be beautiful; let them be affecting, and agitate the mind with whatever passions the poet wishes to impart. The human countenance, as it smiles on those who smile, accompanies also with sympathetic tears those who mourn. If you would have me weep, you must first weep yourself; then, and not before, shall I be touched with your misfortunes.—For nature first makes the emotions of our mind correspond with our circumstances, infusing real joy, sorrow, or resentment, according to the occasion; and afterwards gives the true pathetic utterance to the voice and language." This doctrine, which concerns the orator and the player no less than the poet, is strictly philosophical, and equally applicable to dramatic, to descriptive, and indeed to every species of interesting poetry. The poet's sensibility must first of all engage him warmly in his subject, and in every part of it; otherwise he will labour in vain to interest the reader. If he would paint external nature, as Virgil and Thomson have done, so as to make her amiable to others, he must first be enamoured of her himself; if he would have his heroes and heroines speak the language of love or sorrow, devotion or courage, ambition or anger, benevolence or pity, his heart must be susceptible of those emotions, and in some degree feel them, as long at least as he employs himself in framing words for them; being assured, that

He best shall paint them who can feel them most.

POPE'S *Elisi*, v. 366.

The true poet, therefore, must not only study nature, and know the reality of things; but must also possess fancy, to invent additional decorations; judgment, to direct him in the choice of such as accord with verisimilitude; and sensibility, to enter with ardent emotions into every part of his subject, so as to transmute into every part of his work a pathos and energy sufficient to raise corresponding emotions in the reader.

"The historian and the poet (says Aristotle †) differ in this, that the former exhibits things as they are, the latter as they might be;"—i. e. in that state of perfection which is consistent with probability, and in which, for the sake of our gratification, we wish to find them. If the poet, after all the liberties he is

allowed to take with the truth, can produce nothing more exquisite than is commonly to be met with in history, his reader will be disappointed and dissatisfied. Poetical representations must therefore be framed after a pattern of the highest probable perfection that the genius of the work will admit:—external nature must in them be more picturesque than in reality; action more animated; sentiments more expressive of the feelings and character, and more suitable to the circumstances of the speaker; personages better accomplished in those qualities that raise admiration, pity, terror, and other ardent emotions; and events, more compact, more clearly connected with causes and consequences, and unfolded in an order more flattering to the fancy, and more interesting to the passions. But where, it may be said, is this pattern of perfection to be found? Not in real nature; otherwise history, which delineates real nature, would also delineate this pattern of perfection. It is to be found only in the mind of the poet; and it is imagination, regulated by knowledge, that enables him to form it.

In the beginning of life, and while experience is confined to a small circle, we admire every thing, and are pleased with very moderate excellence. A peasant thinks the hall of his landlord the finest apartment in the universe, listens with rapture to the strolling ballad-singer, and wonders at the rude wooden cuts that adorn his ruder compositions. A child looks upon his native village as a town; upon the brook that runs by, as a river; and upon the meadows and hills in the neighbourhood, as the most spacious and beautiful that can be. But when, after long absence, he returns in his declining years, to visit, once before he die, the dear spot that gave him birth, and those scenes whereof he remembers rather the original charms than the exact proportions; how is he disappointed to find every thing so debased, and so diminished! The hills seem to have sunk into the ground, the brook to be dried up, and the village to be forsaken of its people; the parish-church, stripped of all its fancied magnificence, is become low, gloomy, and narrow; and the fields are now only the miniature of what they were. Had he never left this spot, his notions might have remained the same as at first; and had he travelled but a little way from it, they would not perhaps have received any material enlargement. It seems then to be from observation of many things of the same or similar kinds, that we acquire the talent of forming ideas more perfect than the real objects that lie immediately around us: and these ideas we may improve gradually more and more, according to the vivacity of our mind, and extent of our experience, till at last we come to raise them to a degree of perfection superior to any thing to be found in real life. There cannot, sure, be any mystery in this doctrine; for we think and speak to the same purpose every day. Thus nothing is more common than to say, that such an artist excels all we have ever known in his profession, and yet that we can still conceive a superior performance. A moralist, by bringing together into one view the separate virtues of many persons, is enabled to lay down a system of duty more perfect than any he has ever seen exemplified in human conduct. Whatever be the emotion the poet intends to raise in his reader, whether admiration or terror, joy or sorrow; and whatever be the object he would exhibit,

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exhibit, whether Venus or Tithone, Achilles or Theseus, a palace or a pile of ruins, a dance or a battle; he generally copies an idea of his own imagination; considering each quality as it is found to exist in several individuals of a species, and thence forming an assemblage more or less perfect in its kind, according to the purpose to which he means to apply it.

Hence it would appear, that the ideas of poetry are rather general than singular; rather collected from the examination of a species or class of things, than copied from an individual. And this, according to Aristotle, is in fact the case, at least for the most part; whence that critic determines, that poetry is something more exquisite and more philosophical than history*. The historian may describe Bucephalus, but the poet delineates a war-horse; the former must have seen the animal he speaks of, or received authentic information concerning it, if he mean to describe it historically; for the latter, it is enough that he has seen several animals of that sort. The former tells us, what Achilles actually did and said; the latter, what such a species of human character as that which bears the name of Achilles would probably do or say in certain given circumstances.

It is indeed true, that the poet may, and often does, copy after individual objects. Homer, no doubt, took his characters from the life; or at least, in forming them, was careful to follow tradition as far as the nature of his plan would allow. But he probably took the freedom to add or heighten some qualities, and take away others; to make Achilles, for example, stronger, perhaps, and more impetuous, and more eminent for filial affection, and Hector more patriotic and more amiable, than he really was. If he had not done this, or something like it, his work would have been rather a history than a poem; would have exhibited men and things as they were, and not as they might have been; and *Achilles* and *Hector* would have been the names of individual and real heroes; whereas, according to Aristotle, they are rather to be considered as two distinct modifications or species of the heroic character. Shakspeare's account of the cliffs of Dover comes so near the truth, that we cannot doubt of its having been written by one who had seen them: but he who takes it for an exact historical description, will be surprised when he comes to the place, and finds those cliffs not half so lofty as the poet had made him believe. An historian would be to blame for such amplification; because, being to describe an individual precipice, he ought to tell us just what it is; which if he did, the description would suit that place, and perhaps no other in the whole world. But the poet means only to give an idea of what such a precipice may be; and therefore his description may perhaps be equally applicable to many such chalky precipices on the sea-shore.

This method of copying after general ideas formed by the artist from observation of many individuals, distinguishes the Italian and all the sublime painters, from the Dutch and their imitators. These give us bare nature, with the imperfections and peculiarities of individual things or persons; but those give nature improved as far as probability and the design of the piece will admit. Teniers and Hogarth draw faces, and figures, and dresses, from real life, and present man-

ners; and therefore their pieces must in some degree lose the effect, and become awkward, when the present fashions become obsolete.—Raphael and Reynolds take their models from general nature; avoiding, as far as possible, (at least in all their great performances), those peculiarities that derive their beauty from mere fashion; and therefore their works must give pleasure, and appear elegant, as long as men are capable of forming general ideas, and of judging from them. The last-mentioned incomparable artist is particularly observant of children, whose looks and attitudes, being less under the control of art and local manners, are more characteristic of the species than those of men and women. This field of observation has supplied him with many fine figures, particularly that most exquisite one of Comedy, struggling for and winning (for who could resist her!) the affections of Garrick:—a figure which could never have occurred to the imagination of a painter who had confined his views to grown persons looking and moving in all the formality of polite life;—a figure which in all ages and countries would be pronounced natural and engaging;—whereas those human forms that we see every day bowing, and courtesying, and strutting, and turning out their toes *secundum artem*, and dressed in ruffles, and wigs, and flounces, and hoop-petticoats, and full-trimmed suits, would appear elegant no further than the present fashions are propagated, and no longer than they remain unaltered.

There is, in the progress of human society, as well as of human life, a period to which it is of great importance for the higher order of poets to attend, and from which they will do well to take their characters, and manners, and the æra of their events; namely, that wherein men are raised above savage life, and considerably improved by arts, government, and conversation; but not advanced so high in the ascent towards politeness, as to have acquired a habit of disguising their thoughts and passions, and of reducing their behaviour to the uniformity of the mode. Such was the period which Homer had the good fortune (as a poet) to live in, and to celebrate. This is the period at which the manners of men are most picturesque, and their adventures most romantic. This is the period when the appetites unperverted by luxury, the powers unenervated by effeminacy, and the thoughts disengaged from artificial restraint, will, in persons of similar dispositions and circumstances, operate in nearly the same way; and when, consequently, the characters of particular men will approach to the nature of poetical or general ideas, and, if well imitated, give pleasure to the whole, or at least to a great majority of mankind. But a character tinged with the fashions of polite life would not be so generally interesting. Like a human figure adjusted by a modern dancing-master, and dressed by a modern tailor, it may have a good effect in satire, comedy, or farce: but if introduced into the higher poetry, it would be admired by those only who had learned to admire nothing but present fashions, and by them no longer than the present fashions lasted; and to all the rest of the world would appear awkward, unaffectionate, and perhaps ridiculous. But Achilles and Sarpedon, Diomedes and Hector, Nestor and Ulysses, as drawn by Homer, must in all ages, independently on fashion, command the attention and ad-

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miration of mankind. These have the qualities that are universally known to belong to human nature; whereas the modern fine gentleman is distinguished by qualities that belong only to a particular age, society, and corner of the world. We speak not of moral or intellectual virtues, which are objects of admiration to every age; but of those outward accomplishments, and that particular temperature of the passions, which form the most perceptible part of a human character.—As, therefore, the politician, in discussing the rights of mankind, must often allude to an imaginary state of nature; so the poet who intends to raise admiration, pity, terror, and other important emotions, in the generality of mankind, especially in those readers whose minds are most improved, must take his pictures of life and manners, rather from the heroic period we now speak of, than from the ages of refinement; and must therefore (to repeat the maxim of Aristotle) “exhibit things, not as they are, but as they might be.”

SECT. IV Of Poetical Characters.

12. HORACE seems to think, that a competent knowledge of moral philosophy will fit an author for assigning the suitable qualities and duties to each poetical personage: (*Ar. Poet. v. 309.—316.*) The maxim may be true, as far as mere morality is the aim of the poet; but cannot be understood to refer to the delineation of poetical characters in general: for a thorough acquaintance with all the moral philosophy in the world would not have enabled Blackmore to paint such a personage as Homer's Achilles, Shakespeare's Othello, or the Satan of Paradise Lost. To a competency of moral science, there must be added an extensive knowledge of mankind, a warm and elevated imagination, and the greatest sensibility of heart, before a genius can be formed equal to so difficult a task. Horace is indeed so sensible of the danger of introducing a new character in poetry, that he even discourages the attempt, and advises the poet rather to take his persons from the ancient authors, or from tradition: (*Ibid. v. 119.—130.*)

To conceive the idea of a good man, and to invent and support a great poetical character, are two very different things, however they may seem to have been confounded by some late critics. The first is easy to any person sufficiently instructed in the duties of life: the last is perhaps of all the efforts of human genius the most difficult; so very difficult, that, though attempted by many, Homer, Shakespeare, and Milton, are almost the only authors who have succeeded in it. But characters of perfect virtue are not the most proper for poetry. It seems to be agreed, that the Deity should not be introduced in the machinery of a poetical fable. To ascribe to him words and actions of our own invention, seems very unbecoming; nor can a poetical description, that is known to be, and must of necessity be, infinitely inadequate, ever satisfy the human mind. Poetry, according to the best critics, is an imitation of human action; and therefore poetical characters, though elevated, should still partake of the passions and frailties of humanity. If it were not for the vices of some principal personages, the Iliad would not be either so interesting or so moral:—the most moving and most eventful parts of the Æneid are those that describe the effects of unlawful passion:—

the most instructive tragedy in the world, we mean Macbeth, is founded in crimes of dreadful enormity:—and if Milton had not taken into his plan the fall of our first parents, as well as their state of innocence, his divine poem must have wanted much of its pathos, and could not have been (what it now is) such a treasure of important knowledge, as no other uninspired writer ever comprehended in so small a compass.—Virtue, like truth, is uniform and unchangeable. We may anticipate the part a good man will act in any given circumstances: and therefore the events that depend on such a man must be less surprising than those which proceed from passion; the vicissitudes whereof it is frequently impossible to foresee. From the violent temper of Achilles in the Iliad, spring many great incidents; which could not have taken place, if he had been calm and prudent like Ulysses, or pious and patriotic like Æneas:—his rejection of Agamemnon's offers, in the ninth book, arises from the violence of his resentment;—his yielding to the request of Patroclus, in the 16th, from the violence of his friendship (if we may so speak) counteracting his resentment; and his restoring to Priam the dead body of Hector, in the 24th, from the violence of his affection to his own aged father, and his regard to the command of Jupiter, counteracting, in some measure, both his sorrow for his friend, and his thirst for vengeance.—Besides, except where there is some degree of vice, it pains us too exquisitely to see misfortune; and therefore poetry would cease to have a pleasurable influence over our tender passions, if it were to exhibit virtuous characters only. And as in life, evil is necessary to our moral probation, and the possibility of error to our intellectual improvement; so bad or mixed characters are useful in poetry, to give to the good such opposition, as puts them upon displaying and exercising their virtue.

All those personages, however, in whose fortune the poet means that we should be interested, must have agreeable and admirable qualities to recommend them to our regard. And perhaps the greatest difficulty in the art lies in suitably blending those faults, which the poet finds it expedient to give to any particular hero, with such moral, intellectual, or corporeal accomplishments, as may engage our esteem, pity, or admiration, without weakening our hatred of vice, or love of virtue. In most of our novels, and in many of our plays, it happens unluckily, that the hero of the piece is so captivating, as to incline us to be indulgent to every part of his character, the bad as well as the good. But a great master knows how to give the proper direction to human sensibility; and, without any perversion of our faculties, or any confusion of right and wrong, to make the same person the object of very different emotions, of pity and hatred, of admiration and horror. Who does not esteem and admire Macbeth for his courage and generosity? who does not pity him when beset with all the terrors of a pregnant imagination, superstitious temper, and awakened conscience? who does not abhor him as a monster of cruelty, treachery, and ingratitude? His good qualities, by drawing us near to him, make us, as it were, eye-witnesses of his crime, and give us a fellow-feeling of his remorse; and therefore, his example cannot fail to have a powerful effect in cherishing our love of virtue,

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virtue, and fortifying our minds against criminal impressions: whereas, had he wanted those good qualities, we should have kept aloof from his concerns, or viewed them with a superficial attention; in which case his example would have had little more weight, than that of the robber, of whom we know nothing, but that he was tried, condemned, and executed.—Satan, in *Paradise Lost*, is a character drawn and supported with the most consummate judgment. The old furies and demons, Hecate, Tisiphone, Alecto, Megara, are objects of unmixed and unmitigated abhorrence; Tityus, Enceladus, and their brethren, are remarkable for nothing but impiety, deformity, and vastness of size; Pluto is, at best, an insipid personage; Mars, a hairbrained ruffian; Tasso's infernal tyrant, an ugly and overgrown monster;—but in the Miltonic Satan, we are forced to admire the majesty of the ruined archangel, at the same time that we detest the unconquerable depravity of the fiend. “But, of all poetical characters, (says the elegant critic from whom we are extracting), the Achilles of Homer (r) seems to me the most exquisite of the invention, and the most highly finished. The utility of this character in a moral view is obvious; for it may be considered as the source of all the morality of the *Iliad*. Had not the generous and violent temper of Achilles determined him to patronise the augur Calchas in defiance of Agamemnon, and afterwards, on being affronted by that vindictive commander, to abandon for a time the common cause of Greece;—the fatal effects of dissension among confederates, and of capricious and tyrannical behaviour in a sovereign, would not have been the leading moral of Homer's poetry; nor could Hector, Sarpedon, Eneas, Ulysses, and the other amiable heroes, have been brought forward to signalize their virtues, and recommend themselves to the esteem and imitation of mankind.

“They who form their judgment of Achilles from the imperfect sketch given of him by Horace in the *Art of Poetry*, (v. 121, 122.); and consider him only as a hateful composition of anger, revenge, fierceness, obliquity, and pride, can never enter into the views of Homer, nor be suitably affected with his narration. All these vices are no doubt, in some degree, combined in Achilles; but they are tempered with qualities of a different sort, which render him a most interesting character, and of course make the *Iliad* a most interesting poem. Every reader abhors the faults of this hero: and yet, to an attentive reader of Homer, this hero must be the object of esteem, admiration, and pity; for he has many good as well as bad affections, and is equally violent in all:—Nor is he possessed of a single vice or virtue, which the wonderful art of the poet has not made subservient to the design of the poem, and to the progress and catastrophe of the action; so that the hero of the *Iliad*, considered as a poetical personage, is just what he should be, neither

greater nor less, neither worse nor better.—He is every where distinguished by an abhorrence of oppression, by a liberal and elevated mind, by a passion for glory, and by a love of truth, freedom, and sincerity. He is for the most part attentive to the duties of religion; and, except to those who have injured him, courteous and kind: he is affectionate to his tutor Phoenix; and not only pities the misfortunes of his enemy Priam, but in the most soothing manner administers to him the best consolation that poor Homer's theology could furnish. Though no admirer of the cause in which his evil destiny compels him to engage, he is warmly attached to his native land; and, ardent as he is in vengeance, he is equally so in love to his aged father Peleus, and to his friend Patroclus. He is not luxurious like Paris, nor clownish like Ajax; his accomplishments are princely, and his amusements worthy of a hero. Add to this, as an apology for the vehemence of his anger, that the affront he had received was (according to the manners of that age) of the most atrocious nature; and not only unprovoked, but such as, on the part of Agamemnon, betrayed a brutal infensibility to merit, as well as a proud, selfish, ungrateful, and tyrannical disposition. And though he is often inexcusably furious; yet it is but justice to remark, that he was not naturally cruel (g); and that his wildest outrages were such as in those rude times might be expected from a violent man of invincible strength and valour, when exasperated by injury, and frantic with sorrow.—Our hero's claim to the admiration of mankind is indisputable. Every part of his character is sublime and astonishing. In his person, he is the strongest, the swiftest, and most beautiful of men:—this last circumstance, however, occurs not to his own observation, being too trivial to attract the notice of so great a mind. The Fates had put it in his power, either to return home before the end of the war, or to remain at Troy:—if he chose the former, he would enjoy tranquillity and happiness in his own country to a good old age; if the latter, he must perish in the bloom of his youth:—his affection to his father and native country, and his hatred to Agamemnon, strongly urged him to the first; but a desire to avenge the death of his friend determines him to accept the last, with all its consequences. This at once displays the greatness of his fortitude, the warmth of his friendship, and the violence of his sanguinary passions: and it is this that so often and so powerfully recommends him to the pity, as well as admiration, of the attentive reader.”

It is equally a proof of rich invention and exact judgment in Homer, that he mixes some good qualities in all his bad characters, and some degree of imperfection in almost all his good ones.—Agamemnon, notwithstanding his pride, is an able general, and a valiant man, and highly esteemed as such by the greater part of the army.—Paris, though effeminate,

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(r) “I say the *Achilles* of HOMER. Latter authors have degraded the character of this hero, by supposing every part of his body invulnerable except the heel. I know not how often I have heard this urged as one of Homer's absurdities; and indeed the whole *Iliad* is one continued absurdity, on this supposition. But Homer all along makes his hero equally liable to wounds and death with other men. Nay, to prevent all mistakes in regard to this matter, (if those who cavil at the poet would but read his work), he actually wounds him in the right arm by the lance of Ateropseus, in the battle near the river Scamander. See *Iliad*, xxi. ver. 161.—168.

(g) See *Iliad* xxi. 100, and xxiv. 485.—673.—In the first of these passages, Achilles himself declares, that before Patroclus was slain, he often spared the lives of his enemies, and took pleasure in doing it. It is strange, as Dr Beattie observes, that this should be left out in Pope's Translation.

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nate, and vain of his dress and person, is, however, good-natured, patient of reproach, not destitute of courage, and eminently skilled in music and other fine arts.—Ajax is a huge giant; fearless rather from insensibility to danger, and confidence in his massy arms, than from any nobler principle; boastful and rough; regardless of the gods, though not downright impious: yet there is in his manner something of frankness and blunt sincerity, which entitle him to a share in our esteem; and he is ever ready to assist his countrymen, to whom he renders good service on many a perilous emergency.—The character of Helen, in spite of her faults, and of the many calamities whereof she is the guilty cause, Homer has found means to recommend to our pity, and almost to our love; and this he does, without seeking to extenuate the crime of Paris, of which the most respectable personages in the poem are made to speak with becoming abhorrence. She is so full of remorse, so ready on every occasion to condemn her past conduct, so affectionate to her friends, so willing to do justice to every body's merit, and withal so finely accomplished, that she extorts our admiration, as well as that of the Trojan senators.—Menelaus, though sufficiently sensible of the injury he had received, is yet a man of moderation, clemency, and good-nature, a valiant soldier, and a most affectionate brother: but there is a dash of vanity in his composition, and he entertains rather too high an opinion of his own abilities, yet never overlooks nor undervalues the merit of others.—Priam would claim unreserved esteem, as well as pity, if it were not for his inexcusable weakness, in gratifying the humour, and by indulgence abetting the crimes, of the most worthless of all his children, to the utter ruin of his people, family, and kingdom. Madame Dacier supposes, that he had lost his authority, and was obliged to fall in with the politics of the times: but of this there appears no evidence; on the contrary, he and his unworthy favourite Paris, seem to have been the only persons of distinction in Troy who were averse to the restoring of Helen. Priam's foible (if it can be called by so soft a name), however faulty, is not uncommon, and has often produced calamity both in private and public life. The scripture gives a memorable instance, in the history of the good old Eli.—Sarpedon comes nearer a perfect character, than any other of Homer's heroes; but the part he has to act is short. It is a character, which one could hardly have expected in those rude times: a sovereign prince, who considers himself as a magistrate set up by the people for the public good, and therefore bound in honour and gratitude to be himself their example, and study to excel as much in virtue as in rank and authority.—Hector is the favourite of every reader, and with good reason. To the truest valour he joins the most generous patriotism. He abominates the crime of Paris: but, not being able to prevent the war, he thinks it his duty to defend his country, and his father and sovereign, to the last. He too, as well as Achilles, foresees his own death; which heightens our compassion, and raises our idea of his magnanimity. In all the relations of private life, as a son, a father, a husband, a brother, he is amiable in the highest degree; and he is distinguished among all the heroes for tenderness of affection, gentleness of manners, and a pious regard

to the duties of religion. One circumstance of his character, strongly expressive of a great and delicate mind, we learn from Helen's lamentation over his dead body, that he was almost the only person in Troy, who had always treated her with kindness, and never uttered one reproachful word to give her pain, nor heard others reproach her without blaming them for it. Some tendency to ostentation (which, however, may be pardonable in a commander in chief), and temporary fits of timidity, are the only blemishes discoverable in this hero; whose portrait Homer appears to have drawn with an affectionate and peculiar attention.

By ascribing so many amiable qualities to Hector and some others of the Trojans, the poet interests us in the fate of that people, notwithstanding our being continually kept in mind that they are the injurious party. And by thus blending good and evil, virtue and frailty, in the composition of his characters, he makes them the more conformable to the real appearances of human nature, and more useful as examples for our improvement; and at the same time, without hurting verisimilitude, gives every necessary embellishment to particular parts of his poem, and variety, coherence, and animation, to the whole fable. And it may also be observed, that tho' several of his characters are complex, not one of them is made up of incompatible parts: all are natural and probable, and such as we think we have met with, or might have met with, in our intercourse with mankind.

From the same extensive views of good and evil, in all their forms and combinations, Homer has been enabled to make each of his characters perfectly distinct in itself, and different from all the rest; inso much, that before we come to the end of the Iliad, we are as well acquainted with his heroes, as with the faces and tempers of our most familiar friends. Virgil, by confining himself to a few general ideas of fidelity and fortitude, has made his subordinate heroes a very good sort of people; but they are all the same, and we have no clear knowledge of any one of them. Achilles is faithful, and Gias is brave, and Cloanthus is brave; and this is all we can say of the matter. We see these heroes at a distance, and have some notion of their shape and size; but are not near enough to distinguish their features; and every face seems to exhibit the same faint and ambiguous appearance. But of Homer's heroes we know every particular that can be known. We eat, and drink, and talk, and fight with them: we see them in action, and out of it; in the field, and in their tents and houses:—the very face of the country about Troy, we seem to be as well acquainted with, as if we had been there. Similar characters there are among these heroes, as there are similar faces in every society; but we never mistake one for another. Nestor and Ulysses are both wise, and both eloquent: but the wisdom of the former seems to be the effect of experience; that of the latter, of genius: the eloquence of the one is sweet and copious, but not always to the purpose, and apt to degenerate into story-telling; that of the other is close, emphatical, and persuasive, and accompanied with a peculiar modesty and simplicity of manner. Homer's heroes are all valiant; yet each displays a modification of valour peculiar to himself. One is valiant from principle, another from constitution;

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jectuous and headstrong, another impetuous, but tractable; one is cruel, another merciful; one is insolent and ostentatious, another gentle and unassuming; one is vain of his person, another of his strength, and a third of his family.—It would be tedious to give a complete enumeration. Almost every species of the heroic character is to be found in Homer.

The *Paradise Lost*, though truly Epic, cannot properly be called an *heroic poem*; for the agents in it are not heroes, but beings of a higher order (1). Of these the poet's plan did not admit the introduction of many; but most of those whom he has introduced, are well characterised. We have already spoken of his Satan, which is the highest imaginable species of the diabolical character. The inferior species are well diversified, and in each variety distinctly marked: one is slothful, another avaricious, a third sophistical, a fourth furious; and though all are impious, some are more outrageously and blasphemously so than others.—Adam and Eve, in the state of innocence, are characters well imagined, and well supported; and the different sentiments arising from difference of sex, are traced out with inimitable delicacy, and philosophical propriety. After the fall, he makes them retain the same characters, without any other change than what the transition from innocence to guilt may be supposed to produce: Adam has still that pre-eminence in dignity, and Eve in loveliness, which we should naturally look for in the father and mother of mankind.—Of the blessed spirits, Raphael and Michael are well distinguished; the one for affability, and peculiar goodwill to the human race; the other for majesty, but such as commands veneration rather than fear.—We are sorry to add, that Milton's attempt to soar still higher, only shows, that he had already soared as high, as, without being "blasted with excess of light," it is possible for the human imagination to rise.

From what has been said, it seems abundantly evident.—That the end of poetry is to please; and therefore that the most perfect poetry must be the most pleasing;—that what is unnatural cannot give pleasure; and therefore that poetry must be according to nature;—that it must be either according to real nature, or according to nature somewhat different from the reality;—that, if according to real nature, it would give no greater pleasure than history, which is a transcript of real nature;—that greater pleasure is, however, to be expected from it, because we grant it superior indulgence, in regard to fiction, and the choice of words;—and, consequently, that poetry must be, not according to real nature, but according to nature improved to that degree which is consistent with probability and suitable to the poet's purpose.—And hence it is that we call poetry, *An imitation of nature*.—For that which is properly termed *imitation* has always in it something which is not in the original. If the prototype and transcript be exactly alike; if there be nothing in the one which is not in the other; we may call the latter a *representation*, a *copy*, a *draught*,

or a *picture*, of the former; but we never call it an *imitation*.

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and, &c.

SECT. V. Of Arrangement, Unity, Digressions. —Further remarks on Nature in Poetry.

13. I. The origin of nations, and the beginnings of great events, are little known, and seldom interesting; because the first part of every history, compared with the sequel, is somewhat dry and tedious. But a poet must, even in the beginning of his work, interest the readers, and raise high expectation; not by any affected pomp of style, far less by ample promises or bold professions; but by setting immediately before them some incident, striking enough to raise curiosity, in regard both to its causes and to its consequences. He must therefore take up his story, not at the beginning, but in the middle; or rather, to prevent the work from being too long, as near the end as possible; and afterwards take some proper opportunity to inform us of the preceding events, in the way of narrative, or by conversation of the persons introduced, or by short and natural digressions.

The action of both the *Iliad* and *Odyssey* begins about six weeks before its conclusion; although the principal events of the war of Troy are to be found in the former; and the adventures of a ten years voyage, followed by the suppression of a dangerous domestic enemy, in the latter. One of the first things mentioned by Homer in the *Iliad*, is a plague, which Apollo in anger sent into the Grecian army commanded by Agamemnon and now encamped before Troy. Who this Agamemnon was, and who the Grecians were; for what reason they had come hither; how long the siege had lasted; what memorable actions had been already performed, and in what condition both parties now were;—all this, and much more, we soon learn from occasional hints and conversations interspersed through the poem.

In the *Æneid*, which, though it comprehends the transactions of seven years, opens within a few months of the concluding event, we are first presented with a view of the Trojan fleet at sea, and no less a person than Juno intertelling herself to raise a storm for their destruction. This excites a curiosity to know something further: who these Trojans were; whence they had come, and whither they were bound; why they had left their own country, and what had befallen them since they left it. On all these points, the poet, without quitting the track of his narrative, soon gives the fullest information: The storm rises; the Trojans are driven to Africa, and hospitably received by the queen of the country; at whose desire their commander relates his adventures.

The action of *Paradise Lost* commences not many days before Adam and Eve are expelled from the garden of Eden, which is the concluding event. This poem, as its plan is incomparably more sublime and more important than that of either the *Iliad* or *Æneid*, opens with a far more interesting scene: a multitude of angels and archangels shut up in a region of torment and darkness, and rolling on a lake of unquenchable

(1) Samson, in the *Agonistes*, is a species of the heroic character not to be found in Homer; distinctly marked, and admirably supported. And Delilah, in the same tragedy, is perhaps a more perfect model of an alluring, interesting, worthless woman, than an other to be met with in ancient or modern poetry.

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able fire. Who these angels are, and what brought them into this miserable condition, we naturally wish to know; and the poet in due time informs us; partly from the conversation of the fiends themselves; and more particularly by the mouth of a happy spirit, sent from heaven to caution the father and mother of mankind against temptation, and confirm their good resolutions by unfolding the dreadful effects of impiety and disobedience.

Beattie,
ut supra.

This poetical arrangement of events, so different from the historical, has other advantages besides those arising from brevity, and compactness of detail: it is obviously more affecting to the fancy, and more alarming to the passions; and, being more suitable to the order and the manner in which the actions of other men strikes our senses, is a more exact imitation of human affairs. I hear a sudden noise in the street, and run to see what is the matter. An insurrection has happened, a great multitude is brought together, and something very important is going forward. The scene before me is the first thing that engages my attention; and is in itself so interesting, that for a moment or two I look at it in silence and wonder. By and by, when I get time for reflection, I begin to inquire into the cause of all this tumult, and what it is the people would be at; and one who is better informed than I, explains the affair from the beginning; or perhaps I make this out for myself, from the words and actions of the persons principally concerned.—This is a sort of picture of poetical arrangement, both in epic and dramatic composition; and this plan has been followed in narrative odes and ballads both ancient and modern.—The historian pursues a different method. He begins perhaps with an account of the manners of a certain age, and of the political constitution of a certain country; then introduces a particular person, gives the story of his birth, connections, private character, pursuits, disappointments, and of the events that promoted his views, and brought him acquainted with other turbulent spirits like himself; and so proceeds, unfolding, according to the order of time, the causes, principles, and progress of the conspiracy;—if that be the subject which he undertakes to illustrate. It cannot be denied, that this latter method is more favourable to calm information: but the former, compared with it, will be found to have all the advantages already specified, and to be more effectually productive of that mental pleasure which depends on the passions and imagination.

13. II. If a work have no determinate end, it has no meaning; and if it have many ends, it will distract by its multiplicity. Unity of design, therefore, belongs in some measure to all compositions, whether in verse or prose. But to some it is more essential than to others; and to none so much as to the higher poetry. In certain kinds of history, there is unity sufficient, if all the events recorded be referred to one person; in others, if to one period of time, or to one people, or even to the inhabitants of one and the same planet. But it is not enough, that the subject of a poetical fable be the exploits of one person; for these may be of various and even of opposite sorts and tendencies, and take up longer time than the nature of poetry can admit:—far less can a regular poem comprehend the affairs of one period, or of one people:—it must be li-

mitted to one great action or event, to the illustration of which all the subordinate events must contribute; and these must be so connected with one another, as well as with the poet's general purpose, that one cannot be changed, transposed, or taken away, without affecting the confidence and stability of the whole.† In itself an incident may be interesting, a character well drawn, a description beautiful; and yet, if it disfigure the general plan, or if it obstruct or incumber the main action, instead of helping it forward, a correct artist would consider it but as a gaudy superfluity or splendid deformity; like a piece of scarlet cloth sewed upon a garment of a different colour*. Not that all the parts of the fable either are, or can be, equally essential. Many descriptions and thoughts, of little consequence to the plan, may be admitted for the sake of variety; and the poet may, as well as the historian and philosopher, drop his subject for a time, in order to take up an affecting or instructive digression.

14. III. The doctrine of poetical digressions and episodes has been largely treated by the critics. We shall here only remark, that, in estimating their propriety, three things are to be attended to:—their connection with the fable or subject;—their own peculiar excellence;—and their subserviency to the poet's design.

(1.) Those digressions, that both arise from and terminate in the subject; like the episode of the angel Raphael in Paradise Lost, and the transition to the death of Cæsar and the civil wars in the first book of the *Georgic*; are the most artful, and, if suitably executed, claim the highest praise:—those that arise from, but do not terminate in, the subject, are perhaps second in the order of merit; like the story of Dido in the *Æneid*, and the encomium on a country-life in the second book of the *Georgic*:—those come next, that terminate in, but do not rise from, the fable; of which there are several in the third book of the *Æneid*, and in the *Odyssey*:—and those, that neither terminate in the fable, nor rise from it, are the least artful; and if they be long, cannot escape censure, unless their beauty be very great.

But (2.) we are willing to excuse a beautiful episode, at whatever expence to the subject it may be introduced. They who can blame Virgil for obtruding upon them the charming tale of Orpheus and Eurydice in the fourth *Georgic*, or Milton for the apostrophe to light in the beginning of his third book, ought to forfeit all title to the perusal of good poetry; for of such divine strains one would rather be the author, than of all the books of criticism in the world. Yet still it is better, that an episode possess the beauty of connection, together with its own intrinsic elegance, than this without the other.

Moreover, in judging of the propriety of episodes, and other similar contrivances, it may be expedient to attend, (3.) to the design of the poet, as distinguished from the fable or subject of the poem. The great design, for example, of Virgil, was to interest his countrymen in a poem written with a view to reconcile them to the person and government of Augustus. What, therefore, in the poem tends to promote this design, even though it should, in some degree, hurt the contexture of the fable, is really a proof of the poet's judgment; and may be not only allowed, but applauded.—The progress of the action of the *Æneid* may

seem

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† *Artif.*
Poet. § 8.

* *Hor. Art.*
Poet. v. 15
&c.

of Poetical seem to be too long obstructed in one place, by the story of Dido, which, though it rises from the preceding part of the poem, has no influence upon the sequel; and, in another, by the episode of Cacus, which, without injury to the fable, might have been omitted altogether. Yet these episodes, interesting as they are to us and all mankind, because of the transcendent merit of the poetry, must have been still more interesting to the Romans, because of their connection with the Roman affairs: for the one accounts poetically for their wars with Carthage; and the other not only explains some of their religious ceremonies, but also gives a most charming rural picture of those hills and valleys in the neighbourhood of the Tiber, on which, in after times, their majestic city was fated to stand.—And if we consider, that the design of Homer's Iliad was, not only to show the fatal effects of dissension among confederates, but also to immortalise his country, and celebrate the most distinguished families in it, we shall be inclined to think more favourably than critics generally do, of some of his long speeches and digressions; which, though to us they may seem trivial, must have been very interesting to his countrymen, on account of the genealogies and private history recorded in them.—Shakespeare's historical plays, considered as dramatic fables, and tried by the laws of tragedy and comedy, appear very rude compositions. But if we attend to the poet's design, (as the elegant critic† has with equal truth and beauty explained it), we shall be forced to admire his judgment in the general conduct of those pieces, as well as unequalled success in the execution of particular parts.

† Essays on the writings and genius of Shakespeare, p. 55.

There is yet another point of view in which these digressions may be considered. If they tend to elucidate any important character, or to introduce any interesting event not otherwise within the compass of the poem, or to give an amiable display of any particular virtue, they may be intitled, not to our pardon only, but even to our admiration, however loosely they may hang upon the fable. All these three ends are effected by that most beautiful episode of Hector and Andromache in the sixth book of the Iliad; and the two last, by the no less beautiful one of Euryalus and Nisus, in the ninth of the Æneid.

15. IV. And now, from the position formerly established, that the end of this divine art is to give pleasure, it has been endeavoured to prove, that, whether in displaying the appearances of the material universe, or in imitating the workings of the human mind, and the varieties of human character, or in arranging and combining into one whole the several incidents and parts whereof his fable consists,—the aim of the poet must be, to copy nature, not as it is, but in that state of perfection in which, consistently with the particular genius of the work, and the laws of verisimilitude, it may be supposed to be.

Such, in general, is the nature of that poetry which is intended to raise admiration, pity, and other serious emotions. But in this art, as in all others, there are different degrees of excellence; and we have hitherto directed our view chiefly to the highest. All serious poets are not equally sollicitous to improve nature. Euripides is said to have represented men as they were; Sophocles, more poetically, as they should or might

be*. Theocritus in his Idyls, and Spenser in his Shepherd's Calendar, give us language and sentiments more nearly approaching those of the *Rus verum et barbarum*†, than what we meet with in the Pastorals of Virgil and Pope. In the historical drama, human characters and events must be according to historical truth; or at least not so remote from it as to lead into any important misapprehension of fact. And in the historical epic poem, such as the *Pharsalia* of Lucan, and the Campaign of Addison, the historical arrangement is preferred to the poetical, as being nearer the truth. Yet nature is a little improved even in these poems. The persons in Shakespeare's historical plays, and the heroes of the *Pharsalia*, talk in verse, and suitably to their characters, and with a readiness, beauty, and harmony of expression, not to be met with in real life, nor even in history: speeches are invented, and, to heighten the description, circumstances added, with great latitude: real events are rendered more compact and more strictly dependent upon one another; and fictitious ones brought in, to elucidate human characters, and diversify the narration.

The more poetry improves nature, by copying after general ideas collected from extensive observation, the more it partakes (according to Aristotle) of the nature of philosophy; the greater stretch of fancy and of observation it requires in the artist, and the better chance it has to be universally agreeable.

Yet poetry, when it falls short of this perfection, may have great merit as an instrument of both instruction and pleasure. To most men, simple unadorned nature is, at certain times, and in certain compositions, more agreeable than the most elaborate improvements of art; as a plain short period, without modulation, gives a pleasing variety to a discourse. Many such portraits of simple nature there are in the subordinate parts both of Homer's and of Virgil's poetry: and an excellent effect they have in giving probability to the fiction, as well as in gratifying the reader's fancy with images distinct and lively, and easily comprehended. The historical plays of Shakespeare raise not our pity and terror to such a height, as Lear, Macbeth, or Othello; but they interest and instruct us greatly; notwithstanding. The rudest of the eclogues of Theocritus, or even of Spenser, have by some authors been extolled above those of Virgil, because more like real life. Nay, Corneille is known to have preferred the *Pharsalia* to the *Æneid*, perhaps from its being nearer the truth, or perhaps from the sublime sentiments of Stoical morality so forcibly and so offensively displayed in it.

Poets may refine upon nature too much as well as too little; for affectation and rusticity are equally remote from true elegance. The style and sentiments of comedy should no doubt be more correct and more pointed than those of the most polite conversation: but to make every footman a wit, and every gentleman and lady an epigrammatist, as Congreve has done, is an excessive and faulty refinement. The proper medium has been hit by Menander and Terence, by Shakespeare in his happier scenes, and by Garrick, Cumberland, and some others of late renown. To describe the passion of love with as little delicacy as some men speak of it, would be unpardonable; but to transform it into mere Platonic adoration, is to run into another extreme, less criminal indeed, but too remote

Of Poetical Arrangement, &c.

Arist. Poet. Martial.

Of Poetical
Language.

mote from universal truth to be universally interesting, To the former extreme Ovid inclines; and Petrarch, and his imitators, to the latter. Virgil has happily avoided both: but Milton has painted this passion, as distinct from all others, with such peculiar truth and beauty, that we cannot think Voltaire's encomium too high, when he says, that love in all other poetry seems a weakness, but in Paradise Lost a virtue. There are many good strokes of nature in Ramsay's Gentle Shepherd; but the author's passion for the *rus verum* betrays him into some indelicacies: a censure that falls with greater weight upon Theocritus, who is often absolutely indecent. The Italian pastoral of Tasso and Guarini, and the French of Fontenelle, run into the opposite extreme, (though in some parts beautifully simple), and display a system of rural manners so quaint and affected as to outrage all probability. In fine, though mediocrity of execution in poetry be allowed to deserve the doom pronounced upon it by Horace; yet it is true, notwithstanding, that in this art, as in many other good things, the point of excellence lies in a middle between two extremes; and has been reached by those only who sought to improve nature as far as the genius of their work would permit, keeping at an equal distance from rusticity on the one hand, and affected elegance on the other.

SECT. VI. Of Poetical Language.

16. Words in poetry are chosen, first, for their *sense*; and, secondly, for their *sound*. That the first of these grounds of choice is the more excellent, nobody can deny. He who in literary matters prefers sound to sense, is a fool. Yet sound is to be attended to, even in prose; and in verse demands particular attention. We shall consider poetical language, first, as SIGNIFICANT; and, secondly, as SUSCEPTIBLE OF HARMONY.

§ 1. Of Poetical Language, considered as SIGNIFICANT.

17. If, as it has been endeavoured to prove, poetry be imitative of nature, poetical fictions of real events, poetical images of real appearances in the visible creation, and poetical personages of real human characters; it would seem to follow, that the *language of poetry* must be an imitation of the *language of nature*.

According to Dr Beattie†, that language is natural, when it is suited to the speaker's condition, character, and circumstances. And as, for the most part, the images and sentiments of serious poetry are copied from the images and sentiments, not of real, but of improved, nature; so the language of serious poetry must (as hinted already) be a transcript, not of the real language of nature, which is often dissonant and rude, but of natural language improved as far as may be consistent with probability, and with the supposed character of the speaker. If this be not the case, if the language of poetry be such only as we hear in conversation, or read in history, it will, instead of delight, bring disappointment: because it will fall short of what we expect from an art which is recommended rather by its pleasurable qualities, than by its intrinsic utility; and to which, in order to render it pleasing, we grant higher privileges, than to any other

kind of literary composition, or any other mode of Of Poetical Words.

The next inquiry must therefore be, "What are those improvements that peculiarly belong to the language of poetry?" And these may be comprehended under two heads; *poetical words*, and *tropes and figures*.

Art. I. Of Poetical Words.

18. One mode of improvement peculiar to poetical diction results from the use of those words, and phrases, which, because they rarely occur in prose, and frequently in verse, are by the grammarian and lexicographer termed *poetical*. In these some languages abound more than others: but no language, perhaps, is altogether without them; and perhaps no language can be so, in which any number of good poems have been written. For poetry is better remembered than prose, especially by poetical authors; who will always be apt to imitate the phraseology of those they have been accustomed to read and admire: and thus, in the works of poets, down through successive generations, certain phrases may have been conveyed, which, though originally perhaps in common use, are now confined to poetical composition. Prose-writers are not so apt to imitate one another, at least in words and phrases, both because they do not so well remember one another's phraseology, and also because their language is less artificial, and must not, if they would make it easy and flowing, (without which it cannot be elegant), depart essentially from the style of correct conversation. Poets too, on account of the greater difficulty of their numbers, have, both in the choice and in the arrangement of words, a better claim to indulgence, and stand more in need of a discretionary power.

The language of Homer differs materially from what was written and spoken in Greece in the days of Socrates. It differs in the mode of inflection, it differs in the syntax, it differs even in the words: so that one might read Homer with ease, who could not read Xenophon; or Xenophon, without being able to read Homer. Yet we cannot believe that Homer, or the first Greek poet who wrote in his style, would make choice of a dialect quite different from what was intelligible in his own time: for poets have in all ages written with a view to be read, and to be read with pleasure; which they could not be, if their diction were hard to be understood. It is more reasonable to suppose, that the language of Homer is according to some ancient dialect, which, though not perhaps in familiar use among the Greeks at the time he wrote, was however intelligible. From the Homeric to the Socratic age, a period had elapsed of no less than 400 years; during which the style both of discourse and of writing must have undergone great alterations. Yet the Iliad continued the standard of heroic poetry, and was considered as the very perfection of poetical language; notwithstanding that some words in it were become so antiquated, or so ambiguous, that Aristotle himself seems to have been somewhat doubtful in regard to their meaning. And if Chaucer's merit as a poet had been as great as Homer's, and the English cap. 25. tongue under Edward III. as perfect as the Greek was in the second century after the Trojan war, the style of Chaucer would probably have been our model for

† Essays,
Part II.
chap. 1.

Of Poetical for poetical diction at this day; even as Petrarch, his contemporary, is still imitated by the best poets of Italy.

The rudeness of the style of Ennius has been imputed by the old critics to his having copied too closely the dialect of common life. But this appears to be a mistake. For if we compare the fragments of that author with the comedies of Plautus, who flourished in the same age, and whose language was certainly copied from that of common life, we shall be struck with an air of antiquity in the former that is not in the latter. Ennius, no doubt, like most other sublime poets, affected something of the antique in his expression: and many of his words and phrases, not adopted by any prose-writer now extant, are to be found in Lucretius and Virgil, and were by them transmitted to succeeding poets. These form part of the Roman poetical dialect; which appears from the writings of Virgil, where we have it in perfection, to have been very copious. The style of this charming poet is indeed so different from prose, and is altogether so peculiar, that it is perhaps impossible to analyse it on the common principles of Latin grammar. And yet no author can be more perspicuous or more expressive; notwithstanding the frequency of Grecisms in his syntax, and his love of old words, which he, in the judgment of Quintilian, knew better than any other man how to improve into decoration *.

* *Infili.*
viii. 3. § 3.

The poetical dialect of modern Italy is so different from the prosaic, that persons who can read the historians, and even speak with tolerable fluency the language of that country, may yet find it difficult to construe a page of Petrarch or Tasso. Yet it is not probable, that Petrarch, whose works are a standard of the Italian poetical diction †, made any material innovations in his native tongue. It is rather probable that he wrote it nearly as it was spoken in his time, that is, in the 14th century; omitting only harsh combinations, and taking that liberty which Homer probably, and Virgil certainly, took before him, of reviving such old, but not obsolete expressions, as seemed peculiarly significant and melodious; and polishing his style to that degree of elegance which human speech, without becoming unnatural, may admit of, and which the genius of poetry, as an art subservient to pleasure, may be thought to require.

The French poetry in general is distinguished from prose rather by the rhyme and the measure, than by any old or uncommon phraseology. Yet the French, on certain subjects, imitate the style of their old poets, of Marot in particular; and may therefore be said to have something of a poetical dialect, though far less extensive than the Italian, or even than the English. And it may be presumed, that in future ages they will have more of this dialect than they have at present. This may be inferred from the very uncommon merit of some of their late poets, particularly Boileau and La Fontaine, who, in their respective departments, will continue to be imitated, when the present modes of French prose are greatly changed: an event that, for all the pains they take to preserve their language, must inevitably happen, and whereof there are not wanting some prelates already.

The English poetical dialect is not characterised by any peculiarities of inflection, nor by any great lati-

tude in the use of foreign idioms. More copious it is, however, than one would at first imagine; as may appear from the following specimen and observations.

(1.) A few Greek and Latin idioms are common in English poetry, which are seldom or never to be met with in prose. *QUENCHED OF HOPE.* Shakespeare.—*SHORN OF HIS BEAMS.* Milton.—*Created thing NOR VALUED HE NOR SHUN'D.* Milton.—*'Tis thus we riot, while WHO SOW IT STARVE.* Pope.—*This day BE BREAD AND PEACE MY LOT.* Pope.—*INTO WHAT PIT THOU SEE'ST FROM WHAT HEIGHT FALLEN.* Milton. *He deceived The mother of mankind, WHAT TIME HIS PRIDE HAD CAST HIM OUT OF HEAVEN.* Milton.—Some of these, with others to be found in Milton, seem to have been adopted for the sake of brevity, which in the poetical tongue is indispensable. For the same reason, perhaps the articles *a* and *the* are sometimes omitted by our poets, though less frequently in serious than burlesque composition.—In English, the adjective generally goes before the substantive, the nominative before the verb, and the active verb before (what we call) the accusative. Exceptions, however, to this rule, are not uncommon even in prose. But in poetry they are more frequent. *Their homely joys, AND DESTINY OBSCURE.* Now fades the glimmering landscape on the sight; and all the air a solemn stillness holds. In general, that verification may be less difficult, and the cadence more uniformly pleasing; and sometimes, too, in order to give energy to expression, or vivacity to an image;—the English poet is permitted to take much greater liberties than the prose-writer, in arranging his words, and modulating his lines and periods. Examples may be seen in every page of Paradise Lost.

(2.) Some of our poetical words take an additional syllable, that they may suit the verse the better; as, *dispart, disdain, disport, affright, enchain*, for part, stain, sport, fright, chain. Others seem to be nothing else than common words made shorter, for the convenience of the versifier. Such are, *auxiliar, sub-lunar, trump, vale, part, clime, submiss, frolic, plain, drear, dread, helm, morn, mead, eve* and *even, gan, illumine* and *illumine, ope, hoar, bide, fswage, scape*; for auxiliary, sublunary, trumpet, valley, depart, climate, submissive, frolicsome, complain, dreary, dreadful, helmet, morning, meadow, evening, began or began to, illuminate, open, hoary, abide, assuage, escape.—Of some of these the short form is the more ancient. In Scotland, *even, morn, bides fswage*, are still in vulgar use; but *morn*, except when contradistinguished to *even*, is synonymous, not with *morning* (as in the English poetical dialect), but with *morrow*.—The Latin poets, in a way somewhat similar, and perhaps for a similar reason, shortened *fundamentum, tutamentum, munimentum*, &c. into *fundamen, tutamen, munimen*.

(3.) Of the following words, which are now almost peculiar to poetry, the greater part are ancient, and were once no doubt in common use in England, as many of them still are in Scotland. *Afield, anain, annoy* (a noun), *anon, aye* (ever), *behest, blithe, brand* (sword), *bridal, carol, dame* (lady), *fealty, fell* (an adjective), *gaude, gore, host* (army), *lambkin, late* (of late), *lay* (poem), *lea, glade, gleam, hurl, lore, need, orisons, plod* (to travel laboriously), *ringlets, rue*

† *Vicende della letteratura del D. Minna*, cap. 4.

(a verb), *ruth*, *ruthless*, *sojourn* (a noun), *smite*, *speed* (an active verb), *save* (except), *spray* (twig), *stead*, *strain* (song), *strand*, *swain*, *thrall*, *thrill*, *trail* (a verb), *troll*, *wail*, *welter*, *warble*, *awayward*, *woo*, *the while* (in the mean time), *yon*, *of yore*.

(4.) These that follow are also poetical; but, so far as appears, were never in common use. *Appal*, *arroyo*, *attune*, *battailous*, *breezy*, *car* (chariot), *clarion*, *cates*, *courser*, *darkling*, *flicker*, *floweret*, *emblaze*, *gairish*, *circle*, *impearl*, *nightly*, *noisefless*, *pinion* (wing), *shadowy*, *lumberous*, *streamy*, *troubulous*, *wilder* (a verb), *shrill* (a verb), *brook* (haken), *madding*, *viewless*.—The following too derived from the Greek and Latin, seem peculiar to poetry. *Glang*, *clangor*, *choral*, *bland boreal*, *dire*, *enfangued*, *ire*, *ireful*, *lave* (to wash), *nymph* (lady, girl), *orient*, *panoply*, *philomel*, *insuriate*, *jocund*, *radiant*, *rapt*, *redolent*, *refulgent*, *verdant*, *vernal*, *zephyr*, *zone* (girdle), *glvam*, *justife*.

(5.) In most languages, the rapidity of pronunciation abbreviates some of the commonest words, or even joins two, or perhaps more, of them, into one; and some of those abbreviated forms find admission into writing. The English language was quite disfigured by them in the end of the last century; but Swift, by his satire and example, brought them into disrepute: and, though some of them be retained in conversation, as *don't*, *shan't*, *can't*, they are now avoided in solemn style; and by elegant writers in general, except where the colloquial dialect is imitated, as in comedy. 'Tis and 'twas, since the time of Shafesbury, seem to have been daily losing credit, at least in prose; but still have a place in poetry, perhaps because they contribute to conciseness. 'Twas on a lofty vase's side. Gray. 'Tis true, 'tis certain, man though dead, retains Part of himself. Pope. In verse too, *over* may be shortened into *er*, (which is the Scotch, and probably was the old English, pronunciation); *never* into *ne'er*; and from *the* and *to*, when they go before a word beginning with a vowel, the final letter is sometimes cut off. *O'er hills*, *o'er dales*, *o'er crags*, *o'er rocks* they go. Pope. *Where'er she turns*, *the Graces homage pay*. And *all that beauty*, *all that wealth e'er gave*. *Rich with the spoils of time did ne'er unroll*. Gray. *T' alarm th' eternal midnight of the grave*.—These abbreviations are now peculiar to the poetical tongue, but not necessary to it. They sometimes promote brevity, and render versification less difficult.

(6.) Those words which are commonly called compound epithets, as *rosy-finger'd*, *rosy bosom'd*, *many-twinkling*, *many-founding*, *most-grown*, *bright-eyed*, *straw-blue*, *spirit-firring*, *incense-breathing*, *heaven-taught*, *love-whispering*, *late-resounding*, are also to be considered as part of our poetical dialect. It is true, we have compounded adjectives in familiar use, as *high-seasoned*, *well-natured*, *ill-bred*, and innumerable others. But we speak of those that are less common, that seldom occur except in poetry, and of which in prose the use would appear affected. And that they sometimes promote brevity and vivacity of expression, cannot be denied. But, as they give, when too frequent, a stiff and finical air to a performance; as they are not always explicit in the sense, nor agreeable in

the sound; as they are apt to produce a confusion, or too great a multiplicity, of images; as they tend to disfigure the language, and furnish a pretext for endless innovation; they ought to be used sparingly; and those only used, which the practice of popular authors has rendered familiar to the ear, and which are in themselves peculiar emphatical and harmonious.

(7.) In the transformation of nouns into verbs and participles, our poetical dialect admits of greater latitude than prose. Hymn, pillow, curtain, story, pillar, picture, peal, surge, cavern, honey, career, cincture, bosom, sphere, are common nouns; but to hymn, to pillow, to curtain, to pillar, to picture, to peal, to surge, to cavern, to honey, to career, to cincture, to bosom, to sphere, are common verbs; and to hymning, to pillowing, to curtaining, to pillaring, to picturing, to pealing, to surging, to caverning, to honying, to careering, to cincturing, to bosoming, to sphering, would appear affected in prose, though in verse they are warranted by the very best authority.

Some late poets, particularly the imitators of Spenser, have introduced a great variety of uncommon words, as *certes*, *efisoons*, *ne*, *whilom*, *transfew*, *moil*, *fone*, *lofel*, *albe*, *hight*, *dight*, *pight*, *tews*, *couthful*, *aflost*, *muchel*, *wend*, *arrear*, &c. These were once poetical words, no doubt; but they are now obsolete, and to many readers unintelligible. No man of the present age, however conversant in this dialect, would naturally express himself in it on any interesting emergence; or, supposing this natural to the antiquarian, it would never appear so to the common hearer or reader. A mixture of these words, therefore, must ruin the pathos of modern language; and as they are not familiar to our ear, and plainly appear to be fought after and affected, will generally give a stiffness to modern versification. Yet in subjects approaching to the ludicrous they may have a good effect; as in the *Schoolmistress* of Shenstone, Parnell's *Fairy-tale*, Thomson's *Caitle of Indolence*, and Pope's lines in the *Dunciad* upon *Wormius*. But this effect will be most pleasing to those who have least occasion to recur to the glossary.

Indeed, it is not always easy to fix the boundary between poetical and obsolete expressions. To many readers, *lore*, *meed*, *behest*, *blithe*, *gaude*, *spray*, *thrall*, may already appear antiquated; and to some the style of Spenser, or even of Chaucer, may be as intelligible as that of Dryden. This however we may venture to affirm, that a word, which the majority of readers cannot understand without a glossary, may with reason be considered as obsolete; and ought not to be used in modern composition, unless revived, and recommended to the public ear, by some very eminent writer. There are but few words in Milton, as *nathless*, *tine*, *frere*, *bosky*, &c.; there are but one or two in Dryden, as *falsify* (v); and in Pope, there are none at all, which every reader of our poetry may not be supposed to understand: whereas in Shakespeare there are many, and in Spenser many more, for which one who knows English very well may be obliged to consult the dictionary. The practice of Milton, Dryden, or Pope, may therefore, in almost all cases, be admitted as good authority for the use of a poetical word. And in them, all the words above enumerated, as poetical, and in present use, may actually be found. And of such poets as may choose to observe

(n) Dryden in one place (*Æneid* ix. vers. 1095.) uses *Falsified* to denote *Pierced through and through*. He acknowledges, that this use of the word is an innovation; and that *Falsare* in Italian sometimes means the same thing.

Of Poetical this¹ rule, it will not be said, either that they reject the judgment of Quintilian, who recommends the newest of the old words, and the oldest of the new, or that they are unattentive to Pope's precept;

Be not the first by whom the new are tried.
Nor yet the last to lay the old aside.

Elfr. on Crit. v. 335.

We must not suppose, that these poetical words never occur at all except in poetry. Even from conversation they are not excluded: and the ancient critics allow, that they may be admitted into prose; where they occasionally confer dignity upon a sublime subject, or heighten the ludicrous qualities of a mean one. But it is in poetry only, where the frequent use of them does not favour of affectation.

Nor must we suppose them essential to this art. Many passages there are of exquisite poetry, wherein not a single phrase occurs that might not be used in prose. In fact, the influence of these words in adorning English verse is not very extensive. Some influence however they have. They serve to render the poetical style, first, more melodious; and, secondly, more solemn.

First, They render the poetical style more melodious, and more easily reducible into measure. Words of unwieldy size, or difficult pronunciation, are never used by correct poets, where they can be avoided: unless in their sound they have something imitative of the sense. Homer's poetical inflections contribute wonderfully to the sweetness of his numbers: and if the reader is pleased to look back to the specimen above given of the English poetical dialect, he will find that the words are in general well-sounding, and such as may coalesce with other words, without producing harsh combinations. Quintilian observes, that poets, for the sake of their verse, are indulged in many liberties, not granted to the orator, of lengthening, shortening, and dividing their words*:—and if the Greek and Roman poets claimed this indulgence from necessity, and obtained it, the English, those of them especially who write in rhyme, may claim it with better reason; as the words of their language are less musical, and far less susceptible of variety in arrangement and syntax.

Secondly, Such poetical words as are known to be ancient have something venerable in their appearance, and impart a solemnity to all around them. This remark is from Quintilian; who adds, that they give to a composition that cast and colour of antiquity, which in painting is so highly valued, but which art can never effectually imitate†. Poetical words that are either not ancient, or not known to be such, have, however, a pleasing effect from association. We are accustomed to meet with them in sublime and elegant writing; and hence they come to acquire sublimity and elegance: Even as the words we hear on familiar occasions come to be accounted familiar; and as those that take their rise among pick-pockets, gamblers, and gypsies, are thought too indelicate to be used by any person of taste or good-manners. When one hears the following lines, which abound in poetical words,

The breezy call of incense-breathing morn,
The swallow twittering from the straw-built shed,

The cock's shrill clarion, or the echoing horn,
No more shall rouse them from their lowly bed:

—one is as sensible of the dignity of the language; as one would be of the vulgarity of that man's speech, who should prove his acquaintance with Bridewell, by interlarding his discourse with such terms as *mill-doll*, *queer cull*, or *rubbing cheat*‡; or who, in imitation of fops and gamblers, should, on the common occasions of life, talk of being *beat hollow*, or *saving his distance*§.—What gives dignity to persons; gives dignity to language. A man of this character is one who has borne important employments, been connected with honourable associates, and never degraded himself by levity or immorality of conduct. Dignified phrases are those which have been used to express elevated sentiments, have always made their appearance in elegant composition, and have never been profaned by giving permanency or utterance to the passions of the vile, the giddy, or the worthless. And as by an active old age, the dignity of such men is confirmed and heightened; so the dignity of such words, if they be not suffered to fall into disuse, seldom fails to improve by length of time.

Art 2. Of Tropes and Figures.

19. If it appear, that, by means of figures, language may be made more *pleasing*, and more *natural*, than it would be without them; it will follow, that to poetic language, whose end is to *please* by imitating *nature*, figures must be not only ornamental, but necessary. It will here be proper, therefore, first to point out the importance and utility of figurative language; secondly, to show, that figures are more necessary to poetry in general, than to any other mode of writing.

I. *As to the importance and utility of figurative expression*, in making language more pleasing and more natural; it may be remarked,

(1.) That tropes and figures are often necessary to supply the unavoidable defects of language. When proper words are wanting, or not recollected, or when we do not choose to be always repeating them, we must have recourse to tropes and figures.—When philosophers began to explain the operations of the mind, they found, that most of the words in common use, being framed to answer the more obvious exigencies of life, were in their proper signification applicable to matter only and its qualities. What was to be done in this case? Would they think of making a new language to express the qualities of mind? No: that would have been difficult, or impracticable; and granting it both practicable and easy, they must have foreseen, that nobody would read or listen to what was thus spoken or written, in a new, and consequently in an unknown, tongue. They therefore took the language as they found it; and, wherever they thought there was a similarity or analogy between the qualities of the mind and the qualities of matter, scrupled not to use the names of the material qualities tropically, by applying them to the mental qualities. Hence came the phrases, *solidity* of judgment, *warmth* of imagination, *enlargement* of understanding, and many others; which, though figurative, express the meaning just as well as proper words would have done.

† See the *Scandal's* Dictionary.
‡ See the *Scandal's* Dictionary.
§ See the *Scandal's* Dictionary.

* *Instit.*
Oral. lib. 10.
cap. 1. § 3.

† *I. b.* 8.
cap. 3. § 3.

Of Tropes
and FiguresOf Tropes
and Figures

In fact, numerous as the words in every language are, they must always fall short of the unbounded variety of human thoughts and perceptions. Tastes and smells are almost as numerous as the species of bodies. Sounds admit of perceptible varieties that surpass all computation, and the seven primary colours may be diversified without end. If each variety of external perception were to have a name, language would be insurmountably difficult; nay, if men were to appropriate a class of names to each particular sense, they would multiply words exceedingly, without adding any thing to the clearness of speech. Those words, therefore, that in their proper signification denote the objects of one sense, we often apply tropically to the objects of another, and say, Sweet taste, sweet smell, sweet sound; sharp point, sharp taste, sharp sound; harmony of sounds, harmony of colours, harmony of parts; soft silk, soft colour, soft sound, soft temper; and so in a thousand instances: and yet these words, in their tropical signification, are not less intelligible than in their proper one; for sharp taste and sharp sound, are as expressive as sharp sword; and harmony of tones is not better understood by the musician, than harmony of parts by the architect, and harmony of colours by the painter.

Savages, illiterate persons, and children, have comparatively but few words in proportion to the things they may have occasion to speak of; and must therefore recur to tropes and figures more frequently, than persons of copious elocution. A seaman, or mechanic, even when he talks of that which does not belong to his art, borrows his language from that which does; and this makes his diction figurative to a degree that is sometimes entertaining enough. "Death (says a seaman in one of Smollet's novels) has not yet boarded my comrade; but they have been yard-arm and yard-arm these three glasses. His starboard eye is open, but fast jammed in his head; and the baulkards of his under jaw have given way." These phrases are exaggerated; but we allow them to be natural, because we know that illiterate people are apt to make use of tropes and figures taken from their own trade, even when they speak of things that are very remote and incongruous. In those poems, therefore, that imitate the conversation of illiterate persons, as in comedy, farce, and pastoral, such figures judiciously applied may render the imitation more pleasing, because more exact and natural.

Words that are untuneable and harsh, the poet is often obliged to avoid, when perhaps he has no other way to express their meaning than by tropes and figures; and sometimes the measure of his verse may oblige him to reject a proper word that is not harsh, merely on account of its being too long, or too short, or in any other way unsuitable to the rhythm, or to the rhyme. And hence another use of figurative language, that it contributes to poetical harmony. Thus, *to press the plain* is frequently used to signify *to be slain in battle*; *liquid plain* is put for *ocean*, *blue serene* for *sky*, and *silvan reign* for *country life*.

(2.) Tropes and figures are favourable to delicacy. When the proper name of a thing is in any respect unpleasant, a well-chosen trope will convey the idea in such a way as to give no offence. This is agreeable, and even necessary, in polite conversation, and cannot

be dispensed with in elegant writing of any kind. Many words, from their being often applied to vulgar use, acquire a meanness that disqualifies them for a place in serious poetry; while perhaps, under the influence of a different system of manners, the corresponding words in another language may be elegant, or at least not vulgar. When one reads Homer in the Greek, one takes no offence at his calling Eumeus by a name which, literally rendered, signifies *swine-herd*; first, because the Greek word is well-founding in itself; secondly, because we have never heard it pronounced in conversation, nor consequently debased by vulgar use; and, thirdly, because we know, that the office denoted by it was, in the age of Eumeus, both important and honourable. But Pope would have been blamed, if a name so indelicate as *swine-herd*, had in his translation been applied to so eminent a personage; and therefore he judiciously makes use of the trope *synecdoche*, and calls him *swain* †; † *Odys.* a word both elegant and poetical, and not likely to lead the reader into any mistake about the person spoken of, as his employment had been described in a preceding passage. The same Eumeus is said, in the simple but melodious language of the original, to have been making his own shoes when Ulysses came to his door; a work which in those days the greatest heroes would often find necessary. This too the translator softens by a tropical expression?

Here sat Eumeus, and his cares applied.

To form strong buskins of well-season'd hide.

A hundred other examples might be quoted from this translation; but these will explain our meaning.

There are other occasions, on which the delicacy of figurative language is still more needful: as in Virgil's account of the effects of animal-love, and of the plague among the beasts, in the third Georgic; where Dryden's style, by being less figurative than the original, is in one place exceedingly filthy, and in another shockingly obscene.

Hobbes could construe a Greek author; but his skill in words must have been all derived from the dictionary: for he seems not to have known, that any one articulate sound could be more agreeable, or any one phrase more dignified, than any other. In his Iliad and Odyssey, even when he hits the author's sense (which is not always the case), he proves, by his choice of words, that of harmony, elegance, or energy of style, he had no manner of conception. And hence that work, though called a *Translation of Homer*, does not even deserve the name of *poem*; because it is in every respect unpleasing, being nothing more than a fictitious narrative delivered in a mean prose, with the additional meanness of harsh rhyme, and untuneable measure.—Trapp understood Virgil well enough as a grammarian, and had a taste for his beauties: yet his translation bears no resemblance to Virgil; which is owing to the same cause, an imprudent choice of words and figures, and a total want of harmony.

The delicacy we here contend for, may indeed, both in conversation and in writing, be carried too far. To call *killing an innocent man in a duel* an affair of honour, and a *violation of the rights of wedlock* an affair of gallantry, is a prostitution of figurative language.

Nor

Nor is any credit to us, that we are said to have upwards of 40 figurative phrases to denote excessive drinking. Language of this sort generally implies, that the public abhorrence of such crimes is not so strong as it ought to be; and it is a question, whether even our morals might not be improved, if we were to call these and such like crimes by their proper names, *murder, adultery, drunkenness, gluttony*; names, that not only express our meaning, but also betoken our disapprobation.—As to writing, it cannot be denied, that even Pope himself, in the excellent version just now quoted, has sometimes, for the sake of his numbers, or for fear of giving offence by too close an imitation of Homer's simplicity, employed tropes and figures too quaint or too solemn for the occasion. And the finical style is in part characterised by the writer's dislike to literal expressions, and affectedly substituting in their stead unnecessary tropes and figures. With these authors, a man's only child must always be his *only hope*; a country-maid becomes a *rural beauty*, or perhaps a *nymph of the groves*; if flattery sing at all, it must be a *fyren song*; the shepherd's flute dwindles into an *oaten reed*, and his crook is exalted into a *sceptre*; the *silver lilies* rise from their *golden beds*, and *languish* to the *complaining gale*. A young woman, though a good Christian, cannot make herself agreeable without *sacrificing to the Graces*; nor hope to do any execution among the *gentle swains*, till a whole legion of *Cupid*, armed with *flames and darts*, and other weapons, begin to discharge from her eyes their formidable artillery. For the sake of variety, or of the verse, some of these figures may now and then find a place in a poem; but in prose, unless very sparingly used, they favour of affectation.

(3.) Tropes and figures promote brevity; and brevity, united with perspicuity, is always agreeable. An example or two will be given in the next paragraph. Sentiments thus delivered, and imagery thus painted, are readily apprehended by the mind, make a strong impression upon the fancy, and remain long in the memory; whereas too many words, even when the meaning is good, never fail to bring disgust and weariness. They argue a debility of mind which hinders the author from seeing his thoughts in one distinct point of view; and they also encourage a suspicion, that there is something faulty or defective in the matter. In the poetic style, therefore, which is addressed to the fancy and passions, and intended to make a vivid, a pleasing, and a permanent impression, brevity, and consequently tropes and figures are indispensable. And a language will always be the better suited to poetical purposes, the more it admits of this brevity;—a character which is more conspicuous in the Greek and Latin than in any modern tongue, and much less in the French than in the Italian or English.

(4.) Tropes and figures contribute to strength or energy of language, not only by their conciseness, but also by conveying to the fancy ideas that are easily comprehended, and make a strong impression. We are powerfully affected with what we see, or feel, or hear. When a sentiment comes enforced or illustrated by figures taken from objects of sight, or touch, or hearing, one thinks, as it were, that one sees, or feels, or hears, the thing spoken of; and thus, what in itself would perhaps be obscure, or is merely intel-

lectual, may be made to seize our attention and interest our passions almost as effectually as if it were an object of outward sense. When Virgil calls the Scipios *thunderbolts of war*, he very strongly expresses in one word, and by one image, the rapidity of their victories, the noise their achievements made in the world, and the ruin and conflagration that attended their irresistible career.—When Homer calls Ajax *the bulwark of the Greeks*, he paints with equal brevity his vast size and strength, the difficulty of prevailing against him, and the confidence wherewith his countrymen reposed on his valour.—When Solomon says of the strange woman, or harlot, that “her feet go down to death,” he lets us know, not only that her path ends in destruction, but also, that they who accompany her will find it easy to go forwards to ruin, and difficult to return to their duty.—Satan's enormous magnitude, and resplendent appearance, his perpendicular ascent thro' a region of darkoaks, and the inconceivable rapidity of his motion, are all painted out to our fancy by Milton, in one very short similitude,

Sprung upward, like—a pyramid of fire.

Par. Lost, b. 4. v. 1013.

To take in the full meaning of which figure, we must imagine ourselves in chaos, and a vast luminous body rising upward, near the place where we are, so swiftly as to appear a continued track of light, and lessening to the view according to the increase of distance, till it end in a point, and then disappear; and all this must be supposed to strike our eye at one instant.—Equal to this in propriety, tho' not in magnificence, is that allegory of Gray,

The paths of glory lead but to the grave:

Which presents to the imagination a wide plain, where several roads appear, crowded with glittering multitudes, and issuing from different quarters, but drawing nearer and nearer as they advance, till they terminate in the dark and narrow house, where all their glories enter in succession, and disappear for ever.—When it is said in Scripture, of a good man who died, that he *fell asleep*, what a number of ideas are at once conveyed to our imagination, by this beautiful and expressive figure! As a labourer, at the close of day, goes to sleep, with the satisfaction of having performed his work, and with the agreeable hope of awaking in the morning of a new day, refreshed and cheerful; so a good man, at the end of life, resigns himself calm and contented to the will of his Maker, with the sweet reflection of having endeavoured to do his duty, and with the transporting hope of soon awaking in the regions of light, to life and happiness eternal. The figure also suggests, that to a good man the transition from life to death is, even in the sensation, no more painful, than when our faculties melt away into the pleasing insensibility of sleep.—Satan, flying among the stars, is said by Milton to “*sail between worlds and worlds*,” which has an elegance and force far superior to the proper word *fly*. For by this allusion to a ship, we are made to form a lively idea of his great size, and to conceive of his motion, that it was equable and majestic.—Virgil uses a happy figure to express the size of the great wooden horse, by means of which the Greeks were conveyed into Troy: “*Equum divina*

Ral-

Of Tropes and Figures Palladis arte *edificant*."—Milton is still bolder when he says,

Who would not sing for Lycidas? he knew
Himself to sing, and build the lofty rhyme.

The phrase, however, though bold, is emphatical; and gives a noble idea of the durability of poetry, as well as of the art and attention requisite to form a good poem.—There are hundreds of tropical expressions in common use, incomparably more energetic than any proper words of equal brevity that could be put in their place. A cheek *burning* with blushes, is a trope which at once describes the colour as it appears to the beholder, and the glowing heat as it is felt by the person blushing. *Chilled* with despondence, *pestreft* with astonishment, *thunderstruck* with disagreeable and unexpected intelligence, *melted* with love or pity, *dissolved* in luxury, *hardened* in wickedness, *ssoftening* into remorse, *inflamed* with desire, *tossed* with uncertainty, &c.—every one is sensible of the force of these and the like phrases, and that they must contribute to the energy of composition.

(5.) Tropes and figures promote strength of expression; and are in poetry peculiarly requisite, because they are often more *natural*, and more *imitative*, than proper words. In fact, this is so much the case, that it would be impossible to imitate the language of passion without them. It is true, that when the mind is agitated, one does not run out into allegories, or long-winded similitudes, or any of the figures that require much attention and many words, or that tend to withdraw the fancy from the object of the passion. Yet the language of many passions must be figurative, notwithstanding; because they rouse the fancy, and direct it to objects congenial to their own nature, which diversify the language of the speaker with a multitude of allusions. The fancy of a very angry man, for example, presents to his view a train of disagreeable ideas connected with the passion of anger, and tending to encourage it; and if he speak without restraint during the paroxysm of his rage, those ideas will force themselves upon him, and compel him to give them utterance. "Infernal monster! (he will say)—my blood boils at him; he has used me like a dog; never was man so injured as I have been by this barbarian. He has no more sense of propriety than a stone. His countenance is diabolical, and his soul as ugly as his countenance. His heart is cold and hard, and his resolutions dark and bloody," &c. This speech is wholly figurative. It is made up of *metaphors* and *hyperboles*, which, with the *prosopeia* and *apostrophe*, are the most passionate of all the figures. Lear, driven out of doors by his unnatural daughters, in the midst of darkness, thunder, and tempest, naturally breaks forth (for his indignation is just now raised to the very highest pitch) into the following violent exclamation against the crimes of mankind, in which almost every word is figurative.

Tremble, thou wretch,
That hast within thee undivulged crimes
Unwhipt of justice. Hide thee, thou bloody hand,
Thou perjur'd, and thou simular of virtue,
That art incestuous. Caltiff, to pieces shake,
That under covert, and convenient seeming,

Hast practis'd on man's life. Close pent-up guilts,
Rive your concealing continents, and cry
These dreadful summoners grace. *King Lear.*

—The vehemence of maternal love, and sorrow from the apprehension of losing her child, make the Lady Constance utter a language that is strongly figurative, though quite suitable to the condition and character of the speaker. The passage is too long for a quotation, but concludes thus:

O Lord! my boy, my Arthur, my fair son,
My life, my joy, my food, my all the world,
My widow-comfort, and my sorrow's cure. *King John.*

—Similar to this, and equally expressive of conjugal love, is that beautiful hyperbole in Homer; where Andromache, to dissuade her husband from going out to the battle, tells him, that she had now no mother, father, or brethren, all her kindred being dead, and her native country desolate; and then tenderly adds,

But while my Hector yet survives, I see
My father, mother, brethren, all in thee. *Iliad*, b. 6.

As the passions that agitate the soul, and rouse the fancy, are apt to vent themselves in tropes and figures, so those that depress the mind adopt for the most part a plain diction without any ornament. For to a dejected mind, wherein the imagination is generally inactive, it is not probable that any great variety of ideas will present themselves; and when these are few and familiar, the words that express them must be simple. As no author equals Shakespeare in boldness or variety of figures, when he copies the style of those violent passions that stimulate the fancy; so, when he would exhibit the human mind in a dejected state, no uninspired writer excels him in simplicity. The same Lear whose resentment had impaired his understanding, while it broke out in the most boisterous language, when, after some medical applications, he recovers his reason, his rage being now exhausted, his pride humbled, and his spirits totally depressed, speaks in a style than which nothing can be imagined more simple, or more affecting:

Pray, do not mock me;

I am a very foolish, fond old man,
Fourscore and upward, and, to deal plainly with you,
I fear I am not in my perfect mind.
Methinks I should know you, and know this man;
Yet I am doubtful: for I am mainly ignorant
What place this is; and all the skill I have
Remembers not these garments: nor I know not
Where I did lodge last night.— *LEAR*, act 4. sc. 7.

—Desdemona, ever gentle, artless, and sincere, shocked at the unkindness of her husband, and overcome with melancholy, speaks in a style so beautifully simple, and so perfectly natural, that one knows not what to say in commendation of it:

My mother had a maid call'd Barbara;
She was in love, and he the lov'd prov'd mad,
And did forsake her. She had a song of willow;
An old thing it was, but it express'd her fortune,
And she died singing it. That song to-night
Will not go from my mind; I have much to do,
But to go hang my head all at one side,

And

Of Tropes And sing it like poor Barbara. OTHELLO, *act 4. sc. 3.*

Of Tropes And Figures

Sometimes the imagination, even when exerted to the utmost, takes in but few ideas. This happens when the attention is totally engrossed by some very great object; admiration being one of those emotions that rather suspend the exercise of the faculties, than push them into action. And here, too, the simplest language is the most natural; as when Milton says of the Deity, that he sits "high-thron'd above all height." And as this simplicity is more suitable to that one great exertion which occupies the speaker's mind, than a more elaborate imagery or language would have been; so has it also a more powerful effect in fixing and elevating the imagination of the hearer: for, to introduce other thoughts for the sake of illustrating what cannot be illustrated, could answer no other purpose than to draw off the attention from the principal idea. In these and the like cases, the fancy left to itself will have more satisfaction in pursuing at leisure its own speculations, than in attending to those of others; as they who see for the first time some admirable object, would choose rather to feast upon it in silence, than to have their thoughts interrupted by a long description from another person, informing them of nothing but what they see before them, are already acquainted with, or may easily conceive.

It was remarked above, that the *hyperbole*, *prosopoeia*, and *apostrophe*, are among the most passionate figures. This deserves illustration.

1st, A very angry man is apt to think the injury he has just received, greater than it really is; and, if he proceed immediately to retaliate by word or deed, seldom fails to exceed the due bounds, and to become injurious in his turn. The fond parent looks upon his child as a prodigy of genius and beauty; and the romantic lover will not be persuaded that his mistress has nothing supernatural either in her mind or person. Fear, in like manner, not only magnifies its object when real, but even forms an object out of nothing, and mistakes the fictions of fancy for the intimations of sense.—No wonder then, that they who speak according to the impulse of passion, should speak *hyperbolically*; that the angry man should exaggerate the injury he has received, and the vengeance he is going to inflict; that the sorrowful should magnify what they have lost, and the joyful what they have obtained; that the lover should speak extravagantly of the beauty of his mistress, the coward of the dangers he has encountered, and the credulous clown of the miracles performed by the juggler. In fact, these people would not do justice to what they feel, if they did not say more than the truth. The valiant man, on the other hand, as naturally adopts the diminishing hyperbole when he speaks of danger; and the man of sense, when he is obliged to mention his own virtue or ability; because it appears to him, or he is willing to consider it, as less than the truth, or at best as inconsiderable. Contempt uses the same figure; and therefore Petruccio, affecting that passion, affects also the language of it:

Thou liest, thou thread, thou thimble,
Thou yard, three-quarters, half-yard, quarter, nail,
Thou flea, thou nit, thou winter-cricket, thou!
Brav'd in mine own house with a skin of thread!

Away, thou rag, thou quantity, thou remnant!

Taming of the Shrew, act 4. sc. 1.

For some passions consider their objects as important, and others as unimportant. Of the former sort are anger, love, fear, admiration, joy, sorrow, pride; of the latter are contempt and courage. Those may be said to subdue the mind to the object; and these, to subdue the object to the mind. And the former, when violent, always magnify their objects; whence the hyperbole called amplification, or *auxesis*; and the latter as constantly diminish theirs, and give rise to the hyperbole called *meiosis*, or diminution.—Even when the mind cannot be said to be under the influence of any violent passion, we naturally employ the same figure, when we would express another very strongly with any idea. He is a walking shadow; he is worn to skin and bone; he has one foot in the grave, and the other following;—these, and the like phrases, are proved to be natural by their frequency. By introducing great ideas, the hyperbole is further useful in poetry, as a source of the sublime; but when employed injudiciously, is very apt to become ridiculous. Cowley makes Goliath as big as the hill down which he was marching; and tells us, that when he came into the valley, he seemed to fill it, and to overtop the neighbouring mountains, (which, by the by, seems rather to lessen the mountains and valleys, than to magnify the giant); nay, he adds, that the sun started back when he saw the splendour of his arms. This poet seems to have thought, that the figure in question could never be sufficiently enormous; but Quintilian would have taught him, "*Quamvis omnis hyperbole ultra fidem, non tamen esse debet ultra modum.*" The reason is, that this figure, when excessive, betokens rather absolute insatiation, than intense emotion; and resembles the efforts of a ranting tragedian, or the ravings of an enthusiastic declaimer, who, by putting on the gestures and looks of a lunatic, satisfy the discerning part of their audience, that, instead of feeling strongly, they have no rational feelings at all. In the wildest energies of nature, there is a modesty, which the imitative art will be careful never to overstep.

2^{dly}, That figure, by which things are spoken of as if they were persons, is called *prosopoeia*, or *personification*. It is a bold figure, and yet is often natural. Long acquaintance recommends to some share in our affection even things inanimate, as a house, a tree, a rock, a mountain, a country; and were we to leave such a thing, without hope of return, we should be inclined to address it with a farewell, as if it were a perceptive creature. Nay, we find that ignorant nations have actually worshipped such things, or considered them as the haunt of certain powerful beings. Dryads and Hamadryads were by the Greeks and Romans supposed to reside over trees and groves; river-gods and nymphs, over streams and fountains; little deities, called *Lares* and *Penates*, were believed to be the guardians of hearths and houses. In Scotland there is hardly a hill remarkable for the beauty of its shape, that was not in former times thought to be the habitation of fairies. Nay, modern as well as ancient superstition has appropriated the waters to a peculiar sort of demon or goblin, and peopled the very regions of death,

Of Tropes and Figures death, the tombs and charnel-houses, with multitudes of ghouls and phantoms.—Besides, when things inanimate make a strong impression upon us, whether agreeable or otherwise, we are apt to address them in terms of affection or dislike. The sailor blesses the plank that brought him ashore from the shipwreck; and the passionate man, and sometimes even the philosopher, will say bitter words to the stumbling-block that gave him a fall.—Moreover, a man agitated with any interesting passion, especially of long continuance, is apt to fancy that all nature sympathizes with him. If he has lost a beloved friend, he thinks the sun less bright than at other times; and in the sighing of the winds and groves, in the lowings of the herd, and in the murmurs of the stream, he seems to hear the voice of lamentation. But when joy or hope predominate, the whole world assumes a gay appearance. In the contemplation of every part of nature, of every condition of mankind, of every form of human society, the benevolent and the pious man, the morose and the cheerful, the miser and the misanthrope, finds occasion to indulge his favourite passion, and sees, or thinks he sees, his own temper reflected back in the actions, sympathies, and tendencies of other things and persons. Our affections are indeed the medium through which we may be said to survey ourselves, and every thing else; and whatever be our inward frame, we are apt to perceive a wonderful congeniality in the world without us. And hence, the fancy, when roused by real emotions, or by the pathos of composition, is easily reconciled to those figures of speech that ascribe sympathy, perception, and the other attributes of animal life, to things inanimate, or even to notions merely intellectual.—Motion, too, bears a close affinity to action, and affects our imagination nearly in the same manner; and we see a great part of nature in motion, and by their sensible effects are led to contemplate energies innumerable. These conduct the rational mind to the Great First Cause; and these, in times of ignorance, disposed the vulgar to believe in a variety of subordinate agents employed in producing those appearances that could not otherwise be accounted for. Hence an endless train of fabulous deities, and of witches, demons, fairies, genii; which, if they prove our reason weak and our fancy strong, prove also, that personification is natural to the human mind; and that a right use of this figure may have a powerful effect, in fabulous writing especially, to engage our sympathy in behalf of things as well as persons: for nothing can give lasting delight to a moral being, but that which awakens sympathy, and touches the heart; and though it be true, that we sympathize in some degree even with inanimate things, yet what has, or is supposed to have, life, calls forth a more sincere and more permanent fellow-feeling.—Let it be observed further, that to awaken our sympathetic feelings, a lively conception of their object is necessary. This indeed is true of almost all our emotions; their keenness is in proportion to the vivacity of the perceptions that excite them. Differs that we see, is more affecting than what we only hear of*; a perusal of the gayest scenes in a comedy does not rouse the mind so effectually, as the presence of a cheerful companion; and the death of a friend is of greater energy in producing seriousness, and the consideration of our latter end, than all the pathos of Young. Of descriptions ad-

ressed to the fancy, those that are most vivid and picturesque will generally be found to have the most power. Of Tropes and Figures
 dressful influence over our affections; and those that exhibit persons engaged in action, and adorned with visible insignia, give a briskest impulse to the faculties, that such as convey intellectual ideas only, or images taken from still life. No abstract notion of time, or of love, can be so striking to the fancy, as the image of an old man accoutred with a scythe, or of a beautiful boy with wings and a bow and arrows: and no physiological account of frenzy could suggest so vivid an idea, as the poet has given us in that exquisite portrait,

And moody madness laughing wild, amid severest war

And for this reason partly it is, that the epic poet, in order to work the more effectually upon our passions and imagination, refers the secret springs of human conduct, and the vicissitudes of human affairs, to the agency of personified causes; that is, to the machinery of gods and goddesses, angels, demons, magicians, and other powerful beings. And hence, in all sublime poetry, life and motion, with their several modes and attributes, are liberally bestowed on those objects where-with the author intends that we should be strongly impressed: scenes perfectly inanimate, and still, tending rather to diffuse a languor over the mind, than to communicate to our internal powers those lively energies, without which a being essentially active can never receive complete gratification.—Lastly, some violent passions are peculiarly inclined to change things into persons. The horrors of his mind haunted Orestes in the shape of furies. Conscience, in the form of the murdered person, stares the murderer in the face, and often terrifies him to distraction. The superstitious man, travelling alone in the dark, mistakes a white stone for a ghost, a bush for a demon, a tree waving with the wind for an enormous giant brandishing a hundred arms. The lunatic and enthusiast converse with persons who exist only in their own distempered fancy: and the glutton, and the miser, if they were to give utterance to all their thoughts, would often, it is presumable, speak, the one of his gold, the other of his belly, not only as a person, but as a god,—the object of his warmest love and most devout regard.—More need not be said to prove, that personification is natural, and may frequently contribute to the pathos, energy, and beauty of poetic language.

3dly, *Apophrophe*, or a sudden diversion of speech from one person to another person or thing, is a figure nearly related to the former. Poets sometimes make use of it, in order to help out their verse, or merely to give variety to their style: but on those occasions it is to be considered as rather a trick of art, than an effort of nature. It is most natural, and most pathetic, when the person or thing to whom the apophrophe is made, and for whose sake we give a new direction to our speech, is in our eyes eminently distinguished for good or evil, or raises within us some sudden and powerful emotion, such as the hearer would acquiesce in, or at least acknowledge to be reasonable. But this, like the other pathetic figures, must be used with great prudence. For if, instead of calling forth the hearer's sympathy, it should only betray the levity of the speaker, or such wanderings of his mind as neither the subject nor the occasion would lead one to expect, it will then

* Hor. *Ar.*
Epist. v. 180.

Of Tropes then create disgust, instead of approbation.—The orator, therefore, must not attempt the passionate apostrophe, till the minds of the hearers be prepared to join in it. And every audience is not equally obsequious in this respect. In the forum of ancient Rome that would have passed for sublime and pathetic, which in the most respectable British auditories would appear ridiculous. For our style of public speaking is cool and argumentative; and partakes less of enthusiasm than the Roman did, and much less than the modern French or Italian. Of British eloquence, particularly that of the pulpit, the chief recommendations are gravity and simplicity. And it is vain to say, that our oratory ought to be more vehement: for that matter depends on causes, which it is not only inexpedient, but impossible to alter; namely, on the character and spirit of the people, and their rational notions in regard to religion, policy, and literature. The exclamations of Cicero would weigh but little in our parliament; and many of those which we meet with in French sermons would not be more effectual if attempted in our pulpit. To see one of our preachers, who the moment before was a cool reasoner, a temperate speaker, an humble Christian, and an orthodox divine, break out into a sudden apostrophe to the immortal powers, or to the walls of the church, tends to force a smile, rather than a tear, from those among us who reflect, that there is nothing in the subject, and should be nothing in the orator, to warrant such wanderings of fancy, or vehemence of emotion. If he be careful to cultivate a pure style, and a grave and graceful utterance, a British clergyman, who speaks from conviction the plain unaffected words of truth and soberness, of benevolence and piety, will, it is believed, convey more pathetic, as well as more permanent, impressions to the heart, and be more useful as a Christian teacher, than if he were to put in practice all the attitudes of Roscius, and all the topes and figures of Cicero.

But where the language of passion and enthusiasm is permitted to display itself, whatever raises any strong emotion, whether it be animated or inanimate, absent or present, sensible or intellectual, may give rise to the apostrophe. A man in a distant country, speaking of the place of his birth, might naturally exclaim, "O my dear native land, shall I never see thee more!" Or, when some great misfortune befalls him, "Happy are ye, O my parents, that ye are not alive to see this."—We have a beautiful apostrophe in the third book of the *Æneid*, where *Æneas*, who is telling his story to *Dido*, happening to mention the death of his father, makes a sudden address to him as follows:

—hic, pelagi tot tempestatibus actus,
Heu, genitorum, omnis curæ casusque levamen,
Amitto Anchisen:—hic me, pater optime, fessum
Deseris, heu, tantis nequiquam crepte periculis!

This apostrophe has a pleasing effect. It seems to intimate, that the love which the hero bore his father was so great, that when he mentioned him, he forgot every thing else; and, without minding his company, one of whom was a queen, suddenly addressed himself to that which, though present only in idea, was still a principal object of his affection. An emotion so warm and so reasonable cannot fail to command the sympathy of the reader.—When *Michael*, in the eleventh book of *Paradise Lost*, announces

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to Adam and Eve the necessity of their immediate departure from the garden of Eden, the poet's art in preserving the decorum of the two characters is very remarkable. Pierced to the heart at the thought of leaving that happy place, Eve, in all the violence of ungovernable sorrow, breaks forth into a pathetic apostrophe to *Paradise*, to the flowers she had reared, and to the nuptial bower she had adorned. Adam makes no address to the walks, the trees, or the flowers of the garden, the loss whereof did not so much afflict him; but, in his reply to the Archangel, expresses, without a figure, his regret for being banished from a place where he had been so oft honoured with a sensible manifestation of the Divine presence. The use of the apostrophe in the one case, and the omission of it in the other, not only gives a beautiful variety to the style, but also marks that superior elevation and composure of mind, by which the poet had all along distinguished the character of Adam.—One of the finest applications of this figure that is any where to be seen, is in the fourth book of the same poem; where the author, catching by sympathy the devotion of our first parents, suddenly drops his narrative, and joins his voice to theirs in adoring the Father of the universe.

Thus at their shady lodge arriv'd, both flood,
Both turn'd, and under open sky ador'd
The God that made both sky, air, earth, and heav'n,
Which they beheld, the moon's resplendent globe,
And starry pole:—Thou also mad'st it the night,
Maker Omnipotent! and thou the day,
Which we in our appointed work employ'd
Have finish'd.

Milton took the hint of this fine contrivance from a well-known passage of *Virgil*:

Hic juvenum chorus, ille senum; qui carmine laudes
Hercules et facta ferant; ———
———ut duos mille labores
Rege sub Eurythæo, fati Junonis inique
Pertulerit:—Tu nubigenas, invictæ, bimembres
Hylæum Pholœumque manu; tu Cressa mactas
Prodigia.

The beauty arising from diversified composition is the same in both, and very great in each. But every reader must feel, that the figure is incomparably more affecting to the mind in the imitation, than in the original. So true it is, that the most rational emotions raise the most intense fellow-feeling; and that the apostrophe is then the most emphatical, when it displays those workings of human affection which are at once ardent and well-founded.

To conclude this head: Tropes and figures, particularly the *metaphor*, *similitude*, and *allegory*, are further useful in beautifying language, by suggesting, together with the thoughts essential to the subject, an endless variety of agreeable images, for which there would be no place, if writers were always to confine themselves to the proper names of things. And this beauty and variety, judiciously applied, is so far from distracting, that it tends rather to fix, the attention, and captivate the heart of the readers, by giving light, and life, and pathos to the whole composition.

II. That tropes and figures are more necessary to poetry, than to any other mode of writing, was the second point propoed to be illustrated in this section.

Of Tropes
and Figures.

Language, as already observed, is then natural, when it is suitable to the supposed condition of the speaker. Figurative language is peculiarly suitable to the supposed condition of the poet; because figures are suggested by the fancy; and the fancy of him who composes poetry is more employed, than that of any other author. Of all historical, philosophical, and theological researches, the object is *real* truth, which is fixed and permanent. The aim of rhetorical declamation (according to Cicero) is *apparent* truth; which, being less determinate, leaves the fancy of the speaker more free, gives greater scope to the inventive powers, and supplies the materials of a more figurative phraseology. But the poet is subject to no restraints, but those of verisimilitude; which is still less determinate than rhetorical truth. He seeks not to convince the judgment of his reader by arguments of either real or apparent cogency; he means only to please and interest him, by an appeal to his sensibility and imagination. His own imagination is therefore continually at work, ranging through the whole of real and probable existence, "glancing from heaven to earth, from earth to heaven," in quest of images and ideas suited to the emotions he himself feels, and to the sympathies he would communicate to others. And, consequently, figures of speech, the offspring of ex-cursive fancy, must (if he speak according to what he is supposed to think and feel, that is, according to his supposed condition) tincture the language of the poet more than that of any other composer. So that, if figurative diction be unnatural in geometry, because all wanderings of fancy are unsuitable, and even impossible, to the geometrician, while intent upon his argument; it is, upon the same principle, perfectly natural, and even unavoidable, in poetry; because the more a poet attends to his subject, and the better qualified he is to do it justice, the more active will his imagination be, and the more diversified the ideas that present themselves to his mind.—Besides, the true poet addresses himself to the passions and sympathies of mankind; which, till his own be raised, he cannot hope to do with success. And it is the nature of many passions, though not of all, to increase the activity of imagination: and an active imagination naturally vents itself in figurative language; nay, unless restrained by a correct taste, has a tendency to exceed in it;—of which bishop Taylor, and lord Verulam, two geniuses different in kind, but of the highest order, are memorable examples.

We said, that "the poet seeks not to convince the judgment of his reader by arguments of either real or apparent cogency."—We do not mean, that in poetry argument has no place. The most legitimate reasoning, the soundest philosophy, and narratives purely historical, may appear in a poem, and contribute greatly to the honour of the author, and to the importance of his work. All this we have in *Paradise Lost*.—We mean, that what distinguishes *pure* poetry from other writing, is its aptitude, not to sway the judgment by reasoning, but to please the fancy, and move the passions, by a lively imitation of nature. Nor would we exclude poetical embellishment from history, or even from philosophy. Plato's Dialogues and Addison's Moral Essays abound in poetic imagery; and Livy and Tacitus often amuse their readers with poetical description. In like manner, though geom-

try and physics be different sciences;—though abstract ideas be the subject, and pure demonstration or intuition the evidence, of the former; and though the material universe, and the informations of sense, be the subject and the evidence of the latter;—yet have these sciences been united by the best philosophers, and very happy effects resulted from the union.—In one and the same work, poetry, history, philosophy, and oratory, may doubtless be blended; nay, these arts have all been actually blended in one and the same work, not by Milton only, but also by Homer, Virgil, Lucan, and Shakespeare. Yet still these arts are different;—different in their ends and principles, and in the faculties of the mind to which they are respectively addressed: and it is easy to perceive, when a writer employs one, and when another.

§ 2. Of the Sound of Poetical Language.

20. As the ear, like every other perceptive faculty, is capable of gratification, regard is to be had to the sound of words, even in prose. But to the harmony of language, it behoves the poet, more than any other writer, to attend; as it is more especially his concern to render his work pleasurable. In fact, we find, that no poet was ever popular who did not possess the art of harmonious composition.

What belongs to the subject of Poetical Harmony may be referred to one or other of these heads: Sweetness, Measure, and Imitation.

I. In order to give *sweetness* to language, either in verse or prose, all words of harsh sound, difficult pronunciation, or unwieldy magnitude, are to be avoided as much as possible, unless when they have in the found something peculiarly emphatical; and words are to be so placed in respect of one another, as that discordant combinations may not result from their union. But in poetry this is more necessary than in prose; poetical language being understood to be an imitation of natural language improved to that perfection which is consistent with probability. To poetry, therefore, a greater latitude must be allowed than to prose, in expressing, by tropes and figures of pleasing sound, those ideas whereof the proper names are in any respect offensive, either to the ear or to the fancy.

II. How far verification, or *regular measure*, may be essential to this art, has been disputed by critical writers; some holding it to be indispensably necessary, and some not necessary at all.

The fact seems to be, as already hinted, that to poetry verse is not essential. In a prose work, we may have the fable, the arrangement, and a great deal of the pathos and poeism, of poetry; and such a work is certainly a poem, though perhaps not a perfect one. For how absurd would it be to say, that by changing the position only of a word or two in each line, one might divest Homer's *Iliad* of the poetical character! At this rate, the arts of poetry and verification would be the same; and the rules in Des-pauter's Grammar, and the moral distichs ascribed to Cato, would be as real poetry as any part of Virgil. In fact, some very ancient poems, when translated into a modern tongue, are far less poetical in verse than in prose; the alterations necessary to adapt them to our numbers being detrimental to their sublime simplicity; of which any person of taste will be sensible, who compares our common prose-version of Job,

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the Psalms, and the Song of Solomon; with the best metrical paraphrase of those books that has yet appeared. Nay, in many cases, Comedy will be more poetical, because more pleasing and natural, in prose, than in verse. By versifying Tom Jones and The Merry Wives of Windsor, we should spoil the two finest Comic poems, the one Epic, the other Dramatical, now in the world.

But, secondly, Though verse be not essential to poetry, it is necessary to the perfection of all poetry that admits of it. Verse is to poetry, what colours are to painting (κ). A painter might display great genius, and draw masterly figures with chalk or ink; but if he intend a perfect picture, he must employ in his work as many colours as are seen in the object he imitates. Or, to adopt a beautiful comparison of Demosthenes, quoted by Aristotle †, "Verification is to poetry what bloom is to the human countenance." A good face is agreeable when the bloom is gone, and good poetry may please without verification; harmonious numbers may let off an indifferent poem, and a fine bloom indifferent features: but, without verse, poetry is complete; and beauty is not perfect, unless to sweetness and regularity of feature there be super-added

The bloom of young desire, and purple light of love.

If numbers are necessary to the perfection of the higher poetry, they are no less so to that of the lower kinds, to Pastoral, Song, and Satire, which have little besides the language and verification to distinguish them from prose; and which some ancient authors are unwilling to admit to the rank of poems:—though it seems too nice a scruple, both because such writings are commonly termed *poetical*; and also because there is, even in them, something that may not improperly be considered as an imitation of nature.

That the rhythm and measures of verse are naturally agreeable, and therefore that by these poetry may be made more pleasing than it would be without them, is evident from this, that children and illiterate people, whose admiration we cannot suppose to be the effect of habit or prejudice, are exceedingly delighted with them. In many proverbial sayings, where there is neither rhyme nor alliteration, rhythm is obviously studied. Nay, the use of rhythm in poetry is universal; whereas alliteration and rhyme, though relished by some nations, are not much sought after by others. And we need not be at a loss to account for the agreeableness of proportion and order, if we reflect, that they suggest the agreeable ideas of contrivance and skill, at the same time that they render the connection of things obvious to the understanding, and imprint it deeply on the memory. Verse, by promoting distinct and easy remembrance, conveys ideas to the mind with energy, and enlivens every emotion the poet intends to raise in the reader or hearer. Besides, when we attend to verses, after hearing one or two, we become acquainted with the measure, which therefore we always look for in the sequel. This perpetual interchange of hope and gratification is a

source of delight; and to this in part is owing the pleasure we take in the rhymes of modern poetry. And hence we see, that though an incorrect rhyme, or untuneable verse, be in itself, and compared with an important sentiment, a very trifling matter; yet it is no trifle in regard to its effects on the hearer; because it brings disappointment, and so gives a temporary shock to the mind, and interrupts the current of the affections; and because it suggests the disagreeable ideas of negligence or want of skill on the part of the author. And therefore, as the public ear becomes more delicate, the negligence will be more glaring, and the disappointment more intensely felt; and correctness of rhyme and of measure will of course be the more indispensable. In our tongue, rhyme is more necessary to Lyric than to Heroic poetry. The reason seems to be, that in the latter the ear can of itself perceive the boundary of the measure, because the lines are all of equal length nearly, and every good reader makes a short pause at the end of each; whereas, in the former, the lines vary in length: and therefore the rhyme is requisite to make the measure and rhythm sufficiently perceptible. Custom too may have some influence. English Odes without rhyme are uncommon; and therefore have something awkward about them, or something at least to which the public ear is not yet thoroughly reconciled.

Moreover, in poetry, as in music, rhythm is the source of much pleasing variety; of variety tempered with uniformity, and regulated by art: inasmuch that, notwithstanding the likeness of one hexameter verse to another, it is not common, either in Virgil or in Homer, to meet with two contiguous hexameters whose rhythm is exactly the same. And though all English heroic verses consist of five feet, among which the iambic predominates; yet this measure, in respect of rhythm alone, is susceptible of more than 30 varieties. And let it be remarked further, that different kinds of verse, by being adapted to different subjects and modes of writing, give variety to the poetic language, and multiply the charms of this pleasing art.

What has formerly been shown to be true in regard to style, will also in many cases hold true of verification, "that it is then *natural*, when it is adapted to the *supposed condition of the speaker*."—In the epopee, the poet assumes the character of calm inspiration; and therefore his language must be elevated, and his numbers majestic and uniform. A peasant speaking in heroic or hexameter verse is no improbability here; because his words are supposed to be transmitted by one who will of his own accord give them every ornament necessary to reduce them into dignified measure; as an eloquent man, in a solemn assembly, recapitulating the speech of a clown, would naturally express it in pure and perspicuous language. The uniform heroic measure will suit any subject of dignity, whether narrative or didactic, that admits or requires uniformity of style. In tragedy, where the imitation of real life is more perfect than in epic poetry, the uniform magnificence of epic numbers might be improper; because the heroes and heroines are supposed to speak in their

(κ) Horace seems to hint at the same comparison, when, after specifying the several sorts of verse suitable to Epic, Elegiac, Lyric, and Dramatic Poetry, he adds,

Descriptis servare vices, operumque colores.

Cur ego, si nequeo ignoroque, Poeta salutor? *Ar. Poet. vers. 86.*

† Rhetor.
lib. 3. cap. 4.

Of Poetical Harmony. own persons, and according to the immediate impulse of passion and sentiment. Yet, even in tragedy, the verification may be both harmonious and dignified; because the characters are taken chiefly from high life, and the events from a remote period; and because the higher poetry is permitted to imitate nature, not as it is, but in that state of perfection in which it might be.

The Greeks and Romans considered their hexameter as too artificial for dramatic poetry; and therefore in tragedy, and even in comedy, made use of the iambic, and some other measures that came near the cadence of conversation: we use the iambic both in the epic and dramatic poem; but for the most part it is, or ought to be, much more elaborate in the former than in the latter. In dramatic comedy, where the manners and concerns of familiar life are exhibited, verse would seem to be unnatural, except it be so like the found of common discourse, as to be hardly distinguishable from it. Custom, however, may in some countries determine otherwise; and against custom, in these matters, it is vain to argue. The professed enthusiasm of the dithyrambic poet renders wildness, variety, and a sonorous harmony of numbers, peculiarly suitable to his odes. The love-sonnet, and Anacreontic song, will be less various, more regular, and of a softer harmony; because the state of mind expressed in it has more composure. Philosophy can scarce go further in this investigation, without deviating into whim and hypothesis. The particular forms of verse to be adopted in the lower species of poetry, are determined by fashion chiefly, and the practice of approved authors.

III. The origin and principles of *imitative harmony*, or of that artifice by which the found is made, as Pope says, "an echo to the sense," may be explained in the following manner.

It is pleasing to observe the uniformity of nature in all her operations. Between moral and material beauty and harmony, between moral and material deformity and dissonance, there obtains a very striking analogy. The visible and audible expressions of almost every virtuous emotion are agreeable to the eye and the ear, and those of almost every criminal passion disagreeable. The looks, the attitudes, and the vocal sounds, natural to benevolence, to gratitude, to compassion, to piety, are in themselves graceful and pleasing; while anger, discontent, despair, and cruelty, bring discord to the voice, deformity to the features, and distortion to the limbs. That flowing curve, which painters know to be essential to the beauty of animal shape, gives place to a multiplicity of right lines and sharp angles in the countenance and gesture of him who knits his brows, stretches his nostrils, grinds his teeth, and clenches his fist; whereas devotion, magnanimity, benevolence, contentment, and good-humour, soften the attitude, and give a more graceful swell to the outline of every feature. Certain vocal tones accompany certain mental emotions. The voice of sorrow is feeble and broken, that of despair boisterous and incoherent; joy assumes a sweet and brightly note, fear a weak and tremulous cadence; the tones of love and benevolence are musical and uniform, those of rage loud and dissonant; the voice of the sedate reasoner is equable and grave, but not unpleasant; and he who declaims with energy, employs many varieties of modulation suited to the various emo-

tions that predominate in his discourse.

But it is not in the language of passion only, that the human voice varies its tone, or the human face its features. Every striking sentiment, and every interesting idea, has an effect upon it. One would esteem that person no adept in narrative eloquence, who should describe with the very same accent, swift and slow motion, extreme labour and easy performance, agreeable sensation and excruciating pain; who should talk of the tumult of a tempestuous ocean, the roar of thunder, the devastations of an earthquake, or an Egyptian pyramid tumbling into ruins, in the same tone of voice wherewith he describes the murmur of a rill, the warbling of the harp of Eolus, the swinging of a cradle, or the descent of an angel. Elevation of mind gives dignity to the voice. From Achilles, Sarpedon, and Othello, we should as naturally expect a manly and sonorous accent, as a nervous style and majestic attitude. Coxcombs and bullies, while they assume airs of importance and valour, affect also a dignified articulation.

Since the tones of natural language are so various, poetry, which imitates the language of nature, must also vary its tones; and, in respect of sound as well as of meaning, be framed after that model of ideal perfection, which the variety and energy of the human articulate voice render probable. This is the more easily accomplished, because, in every language, there is between the found and sense of certain words a perceptible analogy; which, though not so accurate as to lead a foreigner from the found to the signification, is yet accurate enough to show, that, in forming such words, regard has been had to the imitative qualities of vocal found. Such, in English, are the words yell, crash, crack, hiss, roar, murmur, and many others.

All the particular laws that regulate this sort of imitation, as far as they are founded in nature, and liable to the cognizance of philosophy, depend on the general law of style above-mentioned. Together with the other circumstances of the supposed speaker, the poet takes into consideration the tone of voice suitable to the ideas that occupy his mind, and thereto adapts the found of his language, if it can be done consistently with ease and elegance of expression. But when this imitative harmony is too much sought after, or words appear to be chosen for found rather than sense, the verse becomes finical and ridiculous. Such is Ronfard's affected imitation of the song of the sky-lark:

Elle quindée du zephire
Sablème en l'air vire et revire,
Et y declique un joli cris,
Qui rit, guérit, et tire l'ire
Des esprit mieux que je n'écris.

This is as ridiculous as that line of Ennius,

Tum tuba terribili sonitu tarantantara dixit:

Or as the following verses of Swift;

The man with the kettle-drum enters the gate,
Dnb dub a dub dub: the trumpeters follow,
Tantara tantara; while all the boys hollow.

Words by their found may imitate found; and quick or slow articulation may imitate quick or slow motion. Hence, by a proper choice and arrangement of words,

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of Poetical Harmony. nity (r),—sweet and tender (g),—loud (h),—and harsh (i);—and *Motions* that are, flow in consequence of dignity (κ),—flow in consequence of difficulty (l), swift and noisy (m),—swift and smooth (n),—uneven and abrupt (o),—quick and joyous (p). An unexpected pause in the verse may also imitate a sudden failure of strength (q), or interruption of motion (a), or give vivacity to an image or thought, by fixing our

attention longer than usual upon the word that precedes it (s).—Moreover, when we describe great bulk, it is natural for us to articulate slowly even in common discourse; and therefore a line of poetry that requires a slow pronunciation, or seems longer than it should be, may be used with good effect in describing vastness of size (r).—Sweet and smooth numbers are most proper, when the poet paints agreeable objects, or gentle energy (v); and harsher sounds when he speaks of

- (r) No sooner had th' Almighty ceas'd, than all
The multitude of angels, with a shout
Loud as from numbers without number, sweet
As from blest voices uttering joy; heav'n rung
With jubilee, and loud hosannas fill'd
The eternal regions.— *Par. Lost*, b. 3.

See also the night-storm of thunder, lightning, wind, and rain, in *Virg. Georg. lib. 1. vers. 328—334*.

- (g) Et longum, formosæ, vale, vale, inquit, Iola.
Virg. Ecl. 1.
Formosam resonare doces Amarillida silvas.
Virg. Ecl. 1.

See also the simile of the nightingale, *Geor. lib. 4. vers. 511*. And see that wonderful couplet describing the wailings of the owl, *Æneid. IV. 462*.

- (h) ——— vibratas ab æthere fulgor
Cum sonitu venit, et rueret omnia vira repente,
Tyrrhenuæque tubæ mugire per æthera clangor;
Suspiciunt iterum atque iterum fragor innotat ingens.
Æneid. 8.

See also the storm in the first book of the *Æneid*, and in the fifth of the *Odyssey*.

- (i) The hoarse rough verse shall like the torrent roar.
Pope.

——— On a sudden open fly,
With impetuous recoil and jarring sound,
Th' infernal doors, and on their hinges grate
Harsh thunder.— *Par. Lost*, II. 879.

See also Homer's *Iliad*, lib. 2. ver. 363, and Clarke's annotation.

- (κ) See an exquisite example in Gray's *Progress of Poetry*; the conclusion of the third stanza.

- (l) And when up ten steep slopes you've dragg'd your
thighs, *Pope.*

Just brought out this, when scarce his tongue could
stir. *Pope.*

——— The huge Leviathan
Wallowing unswift, enormous in their gait,
Tempest the ocean. *Par. Lost*, VII. 411.

See the famous description of Sisyphus rolling the stone, *Odys. lib. 11. vers. 521*. See Quintil. *Inst. Orat. lib. 9. cap. 4. § 4*. compared with *Paradise Lost*, book 2. vers. 1022.

- (m) Quadrupedante putrem sonitu quatit ungula campum.
Æneid.

Ανταρ κενταυροῖσι κολιόεντο λαῶς ἀντιόεις. *Odys. 11.*

See also *Virg. Æneid. lib. 1. vers. 83—87*.

- (n) See wild as the winds o'er the desert he flies.
Pope.

Ille volat, simul arva fuga, simul æquora verrens.
Virg.

Ποδὴν τ' ἰκνύτα πάλιν, χαλῶντα περὶ ἕρποντα, *Hes. d.*

- (o) Πολλὰ δ' ἔκνευτα κατὰ νύκτα παρὰ νύκτι τι δὲ χαλῶντα τ' ἔλθον.
Hom.

The lark shriek'd, started up, and shriek'd again.
Anonymous.

- (p) Let the merry bells ring round,
And the jocund rebeckes found,
To many a youth, and many a maid,
Dancing in the chequer'd shade. *Milton's Allegro*:

See also Gray's *Progress of Poetry*, stanza 3.

- (q) Ac velut in somnis oculos ubi languida preffit
Noctæ quies, nequicquam avidos extendere cursus
Velle videmur:—et in mediis conatibus ægri
Succidimus.— *Æneid.*

See also *Virg. Georg. lib. 3. vers. 515, 516*.

- (a) For this, be sure to-night thou shalt have cramps,
Side-stitches that shall pen thy breath up. Urchins
Shall exercise upon thee.—
Prospero to Caliban in the Tempest.

See *Pope's Iliad*, XIII. 199.

- (s) ——— How often from the sleep
Of echoing hill or thicket have we heard
Celestial voices, to the midnight air,
Sole, — or responsive to each other's note,
Singing their great Creator?— *Par. Lost*, b. 4.

And over them triumphant Death his dart
Shook, — but delay'd to strike. *Id.*

See also *Hom. Odys. l. 9. v. 190*.

- (t) Thus stretch'd out, huge in length, the arch fiend lay.
Par. Lost.

Monstrum horrendum, informe, ingens, cui lumen
ademptum. *Æneid. 3.*

Et magnos membrorum artus, magna ossa, lacertosque
Exiit, atque ingens media consiluit arena.
Æneid. v. 422.

- (v) Hic gelidi fontes, hic mollia prata, Lycori,
Hic nemus, hic ipso tecum consumere mævo.
Virg. Ecl. 10.

The dumb shall sing; the lame his crutch forego,
And leap, exulting, like the bounding roe.
Pope's Messiah.

See *Milton's* description of the evening, *Par. Lost*, book 4. vers. 598—609.

Ye gentle gales, beneath my body blow,
And softly lay me on the waves below.
Pope's Sappho.

Of the
Epopée and
Drama.

of what is ugly, violent, or disagreeable (x). This too is according to the nature of common language; for we generally employ harsher tones of voice to express what we dislike, and more melodious notes to describe the objects of love, complacency, or admiration. Harsh numbers, however, should not be frequent in poetry. For in this art, as in music, concord and melody ought always to predominate. And we find in fact, that good poets can occasionally express themselves somewhat harshly, when the subject requires it, and yet preserve the sweetness and majesty of poetical diction.—Further, the voice of complaint, pity, love, and all the gentler affections, is mild and musical, and should therefore be imitated in musical numbers; while despair, defiance, revenge, and turbulent emotions in general, assume an abrupt and sonorous cadence. Dignity of description (y), solemn vows (z), and all sentiments that proceed from a mind elevated with great ideas (A), require a correspondent pomp of language and versification.—Lastly, an irregular or uncommon movement in the verse, may some-

times be of use, to make the reader conceive an image in a particular manner. Virgil, describing horses running over rocky heights at full speed, begins the line with two dactyls, to imitate rapidity, and concludes it with eight long syllables:

Saxa per, et scopulos, et depressas convalles.

Geor. III. 276.

which is a very unusual measure, but seems well adapted to the thing expressed, namely, to the descent of the animal from the hills to the low ground. At any rate, this extraordinary change of the rhythm may be allowed to bear some resemblance to the animal's change of motion, as it would be felt by a rider, and as we may suppose it is felt by the animal itself.

Other forms of imitative harmony, and many other examples, besides those referred to in the margin, will readily occur to all who are conversant in the writings of the best versifiers, particularly Homer, Virgil, Milton, Lucretius, Spenser, Dryden, Shakespeare, Pope, and Gray.

PART II. OF THE DIFFERENT SPECIES OF POETRY, with their PARTICULAR PRINCIPLES.

SECT. I. Of Epic and Dramatic Compositions.

§ 1. The Epopee and Drama compared.

Elem. of
Criticism

21. **T**RAGEDY and the epic differ not in substantial: in both the same ends are proposed, viz. instruction and amusement; and in both the same mean is employed, viz. imitation of human actions. They differ only in the manner of imitating: epic poetry employs narration; tragedy represents its facts as passing in our sight: in the former, the poet introduces himself as an historian; in the latter, he presents his actors, and never himself.

This difference, regarding form only, may be thought slight: but the effects it occasions, are by no means so; for what we see makes a deeper impression than what we learn from others. A narrative poem is a story told by another: facts and incidents passing upon the stage, come under our own observation; and are beside much enlivened by action and gesture, expressive of many sentiments beyond the reach of language.

A dramatic composition has another property, independent altogether of action; which is, that it makes a deeper impression than narration: in the former, persons express their own sentiments; in the latter, sentiments are related at second-hand. For that reason, Aristotle, the father of critics, lays it down as a rule*, That in an epic poem the author ought to take every opportunity of introducing his actors, and of confining

the narrative part within the narrowest bounds. Homer understood perfectly the advantage of this method; and his poems are both of them in a great measure dramatic. Lucan runs to the opposite extreme: and is guilty of a still greater fault, in stuffing his *Pharsalia* with cold and languid reflections, the merit of which he assumes to himself, and deigns not to share with his actors. Nothing can be more injudiciously timed, than a chain of such reflections, which suspend the battle of *Pharsalia* after the leaders had made their speeches, and the two armies are ready to engage†.

Aristotle, from the nature of the fable, divides *tragedy* into simple and complex: but it is of greater moment, with respect to dramatic as well as epic poetry, to found a distinction upon the different ends attained by such compositions. A poem, whether dramatic or epic, that has nothing in view but to move the passions and to exhibit pictures of virtue and vice, may be distinguished by the name of *pathetic*: but where a story is purposely contrived to illustrate some moral truth, by showing that disorderly passions naturally lead to external misfortunes, such composition may be denominated *moral*. Beside making a deeper impression than can be done by cool reasoning, a moral poem does not fall short of reasoning in affording conviction: the natural connection of vice with misery, and of virtue with happiness, may be illustrated by stating a fact as well as by urging an argument. Let us assume, for example, the following moral truths: That discord among

† Lib. 9.

from line

385 to line

460.

* Poet chap.
25. sect. 6.

(x) Stridenti stipula miserum disperdere carmen.

Virg. *Ecl.* 3.

Immo ego Sardolis videar tibi amarior herbis,

Horridior rufco, projecta vilius alga. Virg. *Ecl.* 7.

Neu patriæ validas in viscera vertite vires.

Virg. *Æneid.* 6.

See also Milton's description of the Lazar-house in *Paradise Lost*, b. 11. v. 477—494.

(y) See Virg. *Geor.* I. 328. and Homer, Virgil, and Milton, *passim*. See also Dryden's *Alexander's Feast*, and Gray's *Odes*.

(z) See Virg. *Æneid.* IV. 24.

(A) Examples are frequent in the great authors. See Othello's exclamation:

— O now for ever

Farewell the tranquil mind! &c: *Act 3. sc. 3.*

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among the chiefs renders ineffectual all common measures; and that the consequences of a slightly-founded quarrel, fostered by pride and arrogance, are not less fatal than those of the grossest injury: these truths may be inculcated, by the quarrel between Agamemnon and Achilles at the siege of Troy. If facts or circumstances be wanting, such as tend to rouse the turbulent passions, they must be invented; but no accidental nor unaccountable event ought to be admitted; for the necessary or probable connection between vice and misery is not learned from any events but what are naturally occasioned by the characters and passions of the persons represented, acting in such circumstances. A real event of which we see not the cause, may afford a lesson, upon the presumption that what hath happened may again happen: but this cannot be inferred from a story that is known to be a fiction.

Many are the good effects of such compositions. A pathetic composition, whether epic or dramatic, tends to a habit of virtue, by exciting us to do what is right, and restraining us from what is wrong. Its frequent pictures of human woes, produce, beside, two effects extremely salutary: they improve our sympathy, and fortify us to bear our own misfortunes. A moral composition must obviously produce the same good effects, because by being moral it ceaseth not to be pathetic: it enjoys beside an excellence peculiar to itself; for it not only improves the heart, as above-mentioned, but instructs the head by the moral it contains. It seems impossible to imagine any entertainment more suited to a rational being, than a work thus happily illustrating some moral truth; where a number of persons of different characters are engaged in an important action, some retarding, others promoting, the great catastrophe; and where there is dignity of style as well as of matter. A work of this kind has our sympathy at command, and can put in motion the whole train of the social affections: our curiosity in some scenes is excited, in others gratified; and our delight is consumed at the close, upon finding, from the characters and situations exhibited at the commencement, that every incident down to the final catastrophe is natural, and that the whole in conjunction make a regular chain of causes and effects.

Considering that an epic and a dramatic poem are the same in substance, and have the same aim or end, one will readily imagine, that subjects proper for the one must be equally proper for the other. But considering their difference as to form, there will be found reason to correct that conjecture, at least in some degree. Many subjects may indeed be treated with equal advantage in either form: but the subjects are still more numerous for which they are not equally qualified; and there are subjects proper for the one, and not at all for the other. To give some slight notion of the difference, as there is no room here for enlarging upon every article, we observe, that dialogue is better qualified for expressing sentiments, and narrative for displaying facts. Heroism, magnanimity, undaunted courage, and other elevated virtues, figure best in action: tender passions, and the whole tribe of sympathetic affections, figure best in sentiment. It clearly follows, that tender passions are more peculiarly the province of tragedy, grand and heroic actions of epic poetry.

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22. We have no occasion to say more upon the epic, considered as peculiarly adapted to certain subjects. But as dramatic subjects are more complex, it is necessary to take a narrower view of them; which we do the more willingly, in order to clear a point thrown into great obscurity by critics.

The subject best fitted for tragedy is where a man has himself been the cause of his misfortune; not so as to be deeply guilty, nor altogether innocent: the misfortune must be occasioned by a fault incident to human nature, and therefore in some degree venial. Such misfortunes call forth the social affections, and warmly interest the spectator. An accidental misfortune, if not extremely singular, doth not greatly move our pity: the person who suffers, being innocent, is freed from the greatest of all torments, that anguish of mind which is occasioned by remorse. An atrocious criminal, on the other hand, who brings misfortunes upon himself, excites little pity, for a different reason: his remorse, it is true, aggravates his distress, and swells the first emotions of pity; but then our hatred of him as a criminal blending with pity, blunts its edge considerably. Misfortunes that are not innocent, nor highly criminal, partake the advantages of each extreme: they are attended with remorse to embitter the distress, which raises our pity to a great height; and the slight indignation we have at a venial fault, detracts not sensibly from our pity. The happiest of all subjects accordingly for raising pity, is where a man of integrity falls into a great misfortune by doing an action that is innocent, but which, by some singular means, is conceived by him to be criminal: his remorse aggravates his distress; and our compassion, unrestrained by indignation, knows no bounds. Pity comes thus to be the ruling passion of a pathetic tragedy; and, by proper representation, may be raised to a height scarce exceeded by any thing felt in real life. A moral tragedy takes in a larger field; as it not only exercises our pity, but raises another passion, which, though selfish, deserves to be cherished equally with the social affection. The passion we have in view is fear or terror; for when a misfortune is the natural consequence of some wrong bias in the temper, every spectator who is conscious of such a bias in himself, takes the alarm, and dreads his falling into the same misfortune: and by the emotion of fear or terror, frequently reiterated in a variety of moral tragedies, the spectators are put upon their guard against the disorders of passion.

The commentators upon Aristotle, and other critics, have been much grieved about the account given of tragedy by that author: "That by means of pity and terror, it refines or purifies in usual sorts of passion." But no one who has a clear conception of the end and effects of a good tragedy, can have any difficulty about Aristotle's meaning: Our pity is engaged for the persons represented; and our terror is upon our own account. Pity indeed is here made to stand for all the sympathetic emotions, because of these it is the capital. There can be no doubt, that our sympathetic emotions are refined or improved by daily exercise; and in what manner our other passions are refined by terror, has been just now said. One thing is certain, that no other meaning can justly be given to the foregoing doctrine than that now mentioned; and that it was really

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Aristotle's meaning, appears from his 13th chapter, where he delivers several propositions conformable to the doctrine as here explained. These, at the same time, we take liberty to mention; because, so far as authority can go, they confirm the foregoing reasoning about subjects proper for tragedy. The first proposition is, That it being the province of tragedy to excite pity and terror, an innocent person falling into adversity ought never to be the subject. This proposition is a necessary consequence of his doctrine as explained: a subject of that nature may indeed excite pity and terror; but the former in an inferior degree, and the latter in no degree for moral instruction. The second proposition is, That the history of a wicked person in a change from misery to happiness, ought not to be represented; which excites neither terror nor compassion, nor is agreeable in any respect. The third is, That the misfortunes of a wicked person ought not to be represented: such representation may be agreeable in some measure upon a principle of justice; but it will not move our pity; nor any degree of terror, except in those of the same vicious disposition with the person represented. The last proposition is, That the only character fit for representation lies in the middle, neither eminently good nor eminently bad; where the misfortune is not the effect of deliberate vice, but of some involuntary fault, as our author expresses it. The only objection we find to Aristotle's account of tragedy, is, that he confines it within too narrow bounds, by refusing admittance to the pathetic kind: for if terror be essential to tragedy, no representation deserves that name but the moral kind, where the misfortunes exhibited are caused by a wrong balance of mind, or some disorder in the internal constitution: such misfortunes always suggest moral instruction; and by such misfortunes only, can terror be excited for our improvement.

Thus Aristotle's four propositions above-mentioned, relates solely to tragedies of the moral kind. Those of the pathetic kind, are not confined within so narrow limits: subjects fitted for the theatre, are not in such plenty as to make us reject innocent misfortunes which rouse our sympathy, though they inculcate no moral. With respect indeed to the subjects of that kind, it may be doubted, whether the conclusion ought not always to be fortunate. Where a person of integrity is represented as suffering to the end under misfortunes purely accidental, we depart discontented, and with some obscure sense of injustice: for seldom is man so submissive to Providence, as not to revolt against the tyranny and vexations of blind chance; he will be tempted to say, This ought not to be. We give for an example the *Romeo and Juliet* of Shakspeare, where the fatal catastrophe is occasioned by Friar Laurence's coming to the monument a minute too late: we are vexed at the unlucky chance, and go away dissatisfied. Such impressions, which ought not to be cherished, are a sufficient reason for excluding stories of this kind from the theatre. The misfortunes of a virtuous person, arising from necessary causes, or from a chain of unavoidable circumstances, will be considered in a different light. Chance, giving an impression of anarchy and misuse, produces always a gloomy prospect: on the contrary, a regular chain of causes and effects directed by the general laws of nature, never fails to

suggest the hand of Providence; to which we submit without resentment, being conscious that submission is our duty. For that reason, we are not disgusted with the distresses of Voltaire's *Mariamne*, though redoubled on her till her death, without the least fault or failing on her part: her misfortunes are owing to a cause extremely natural, and not unfrequent, the jealousy of a barbarous husband. The fate of Desdemona in the *Moor of Venice*, affects us in the same manner. We are not so easily reconciled to the fate of Cordelia in *King Lear*: the causes of her misfortune are by no means so evident, as to exclude the gloomy notion of chance. In short, a perfect character suffering under misfortunes, is qualified for being the subject of a pathetic tragedy, provided chance be excluded. Nor is a perfect character altogether inconsistent with a moral tragedy: it may successfully be introduced as an under-part, if the chief place be filled with an imperfect character from which a moral can be drawn. This is the case of Desdemona and Mariamne just mentioned; and it is the case of Mounimia and Belvidera, in Otway's two tragedies, *The Orphan* and *Venice preserved*.

According to our author *, fable operates on our passions, by representing its events as passing in our sight, and by deluding us into a conviction of reality. Hence, in epic and dramatic compositions, every circumstance ought to be employed that may promote the delusion; such as the borrowing from history some noted event, with the addition of circumstances that may answer the author's purpose: the principal facts are known to be true; and we are disposed to extend our belief to every circumstance. But in choosing a subject that makes a figure in history, greater precaution is necessary than where the whole is a fiction. In the latter case there is full scope for invention: the author is under no restraint other than that the characters and incidents be just copies of nature. But where the story is founded on truth, no circumstances must be added, but such as connect naturally with what are known to be true; history may be supplied, but must not be contradicted. Further, the subject chosen must be distant in time, or at least in place; for the familiarity of recent persons and events ought to be avoided. Familiarity ought more especially to be avoided in an epic poem, the peculiar character of which is dignity and elevation: modern manners make but a poor figure in such a poem. Their familiarity unqualifies them for a lofty subject. The dignity of them will be better understood in future ages, when they are no longer familiar.

After Voltaire, no writer, it is probable, will think of rearing an epic poem upon a recent event in the history of his own country. But an event of that kind is perhaps not altogether unqualified for tragedy: it was admitted in Greece; and Shakspeare has employed it successfully in several of his pieces. One advantage it possesses above fiction, that of more readily engaging our belief, which tends above any other particular to raise our sympathy. The scene of comedy is generally laid at home: familiarity is no objection; and we are peculiarly sensible of the ridicule of our own manners.

After a proper subject is chosen, the dividing it into parts requires some art. The conclusion of a book in

Of the
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* *Ld Kames*,
on *Elem. of*
Crit. ch. ii.
part 1. § 7.

Of the
Epopée and
Drama.

Of the
Epopée.

Elem. of
Criticism,
ch. 12.

in an epic poem, or of an act in a play, cannot be altogether arbitrary; nor be intended for so slight a purpose as to make the parts of equal length. The supposed pause at the end of every book, and the real pause at the end of every act, ought always to coincide with some pause in the action. In this respect, a dramatic or epic poem ought to resemble a sentence or purpose in language, divided into members that are distinguished from each other by proper pauses; or it ought to resemble a piece of music, having a full close at the end, preceded by imperfect closes that contribute to the melody. Every act in a dramatic poem ought therefore to close with some incident that makes a pause in the action; for otherwise there can be no pretext for interrupting the representation. It would be absurd to break off in the very heat of action; against which every one would exclaim: the absurdity still remains where the action relents, if it be not actually suspended for some time. This rule is also applicable to an epic poem: though in it a deviation from the rule is less remarkable; because it is in the reader's power to hide the absurdity, by proceeding instantly to another book. The first book of *Paradise Lost* ends without any close, perfect or imperfect: it breaks off abruptly, where Satan, seated on his throne, is prepared to harangue the convocated host of the fallen angels; and the second book begins with the speech. Milton seems to have copied the *Æneid*, of which the two first books are divided much in the same manner. Neither is there any proper pause at the end of the seventh book of *Paradise Lost*, nor at the end of the eleventh. In the *Iliad* little attention is given to this rule.

This branch of the subject shall be closed with a general rule, That action being the fundamental part of every composition, whether epic or dramatic, the sentiments and tone of language ought to be subservient to the action, so as to appear natural, and proper for the occasion. The application of this rule to our modern plays, would reduce the bulk of them to a skeleton.

§ 2. *Respective peculiarities of the Epopee and Drama.*

23. In a theatrical entertainment, which employs both the eye and the ear, it would be a gross absurdity to introduce upon the stage superior beings in a visible shape. There is no place for such objection in an epic poem; and Boileau, with many other critics, declares strongly for that sort of machinery in an epic poem. But waving authority, which is apt to impose upon the judgment, let us draw what light we can from reason. We may in the first place observe, that this matter is but indistinctly handled by critics: the poetical privilege of animating insensible objects for enlivening a description, is very different from what is termed *machinery*, where deities, angels, devils, or other supernatural powers, are introduced as real personages, mixing in the action, and contributing to the catastrophe; and yet these two things are constantly jumbled together in reasoning. The former is founded on a natural principle: but nothing is more unnatural than the latter. Its effects, at the same time, are deplorable. First, it gives an air of fiction to the whole; and prevents that impression of reality which is requisite to interest our affections, and to move our

passions: which of itself is sufficient to explode machinery, whatever entertainment it may afford to readers of a fantastic taste or irregular imagination. And, next, were it possible, by disguising the fiction, to de-lude us into a notion of reality, an insuperable objection would still remain, which is, that the aim or end of an epic poem can never be attained in any perfection where machinery is introduced; for an evident reason, that virtuous emotions cannot be raised successfully but by the actions of those who are endued with passions and affections like our own, that is, by human actions: and as for moral instruction, it is clear, that none can be drawn from beings who act not upon the same principles with us. A fable in *Æsop's* manner is no objection to this reasoning: his lions, bulls, and goats, are truly men under disguise; they act and feel in every respect as human beings; and the moral we draw is founded on that supposition. Homer, it is true, introduces the gods into his fable: but the religion of his country authorised that liberty; it being an article in the Grecian creed, that the gods often interpose visibly and bodily in human affairs. It must however be observed, that Homer's deities do no honour to his poems: fictions that transgress the bounds of nature, seldom have a good effect; they may inflame the imagination for a moment, but will not be relished by any person of a correct taste. They may be of some use to the lower rank of writers; but an author of genius has much finer materials of Nature's production, for elevating his subject, and making it interesting.

One would be apt to think, that Boileau, declaring for the Heathen deities, intended them only for embellishing the diction: but unluckily he banishes angels and devils, who undoubtedly make a figure in poetic language, equal to the Heathen deities. Boileau, therefore, by pleading for the latter in opposition to the former, certainly meant, if he had any distinct meaning, that the Heathen deities may be introduced as actors. And, in fact, he himself is guilty of that glaring absurdity, where it is not so pardonable as in an epic poem: In his ode upon the taking of Namur, he demands with a most serious countenance, whether the walls were built by Apollo or Neptune: and in relating the passage of the Rhine, anno 1672, he describes the god of that river as fighting with all his might to oppose the French monarch; which is confounding fiction with reality at a strange rate. The French writers in general run into this error: wonderful the effect of custom, entirely to hide from them how ridiculous such fictions are!

That this is a capital error in *Jerusalemme liberata*, Tasso's greatest admirers must acknowledge: a situation can never be intricate, nor the reader ever in pain about the catastrophe, so long as there is an angel, devil, or magician, to lend a helping hand. Voltaire, in his essay upon epic poetry, talking of the *Pharsalia*, observes judiciously, "That the proximity of time, the notoriety of events, the character of the age, enlightened and political, joined with the solidity of Lucan's subject, deprived him of poetical fiction." Is it not amazing, that a critic who reasons so justly with respect to others, can be so blind with respect to himself? Voltaire, not satisfied to enrich his language with images drawn from invisible and supe-

rior beings, introduces them into the action: in the sixth canto of the *Henriade*, St Louis appears in person, and terrifies the soldiers; in the seventh canto, St Louis sends the god of Sleep to Henry; and, in the tenth, the demons of Discord, Fanaticism, War, &c. assist Aumale in a single combat with Turenne, and are driven away by a good angel brandishing the sword of God. To blend such fictitious personages in the same action with mortals, makes a bad figure at any rate; and is intolerable in a history so recent as that of Henry IV. But perfection is not the lot of man.

But perhaps the most successful weapon that can be employed upon this subject is ridicule. Addison has applied this in an elegant manner: "Whereas the time of a general peace is, in all appearance, drawing near; being informed that there are several ingenious persons who intend to shew their talents on so happy an occasion, and being willing, as much as in me lies, to prevent that effusion of nonsense which we have good cause to apprehend; I do hereby strictly require every person who shall write on this subject, to remember that he is a Christian, and not to sacrifice his catholicism to his poetry. In order to it, I do expect of him, in the first place, to make his own poem, without depending upon Phœbus for any part of it, or calling out for aid upon any of the Muses by name. I do likewise positively forbid the sending of Mercury with any particular message or dispatch relating to the peace; and shall by no means suffer Minerva to take upon her the shape of any plenipotentiary concerned in this great work. I do further declare, that I shall not allow the Destinies to have had a hand in the deaths of the several thousands who have been slain in the late war; being of opinion that all such deaths may be well accounted for by the Christian system of powder and ball. I do therefore strictly forbid the Fates to cut the thread of man's life upon any pretence whatsoever, unless it be for the sake of rhyme. And whereas I have good reason to fear, that Neptune will have a great deal of business on his hands in several poems which we may now suppose are upon the anvil, I do also prohibit his appearance, unless it be done in metaphor, simile, or any very short allusion; and that even here he may not be permitted to enter, but with great caution and circumspection. I desire that the same rule may be extended to his whole fraternity of Heathen gods; it being my design to condemn every poem to the flames in which Jupiter thunders, or exercises any other act of authority which does not belong to him. In short, I expect that no Pagan agent shall be introduced, or any fact related which a man cannot give credit to with a good conscience. Provided always, that nothing herein contained shall extend, or be construed to extend, to several of the female poets in this nation, who shall still be left in full possession of their gods and goddesses, in the same manner as if this paper had never been written." *Spect.* n^o 523.

The marvellous is indeed so much promoted by machinery, that it is not wonderful to find it embraced by the bulk of writers, and perhaps of readers. If indulged at all, it is generally indulged to excess. Homer introduceth his deities with no greater ceremony than his mortals; and Virgil has still less modera-

tion: a pilot spent with watching cannot fall asleep and drop into the sea by natural means: one bed cannot receive the two lovers *Æneas* and *Dido*, without the immediate interposition of superior powers. The ridiculous in such fictions, must appear even thro' the thickest veil of gravity and solemnity.

Angels and devils serve equally with Heathen deities as materials for figurative language; perhaps better among Christians, because we believe in them, and not in Heathen deities. But every one is sensible, as well as Boileau, that the invisible powers in our creed make a much worse figure as actors in a modern poem, than the invisible powers in the Heathen creed did in ancient poems; the cause of which is not far to seek. The Heathen deities, in the opinion of their votaries, were beings elevated one step only above mankind, subject to the same passions, and directed by the same motives; therefore not altogether improper to mix with men in an important action. In our creed, superior beings are placed at such a mighty distance from us, and are of a nature so different, that with no propriety can we appear with them upon the same stage: man, a creature much inferior, loses all dignity in the comparison.

There can be no doubt, that an historical poem admits the embellishment of allegory, as well as of metaphor, simile, or other figure. Moral truth, in particular, is finely illustrated in the allegorical manner: it amuses the fancy to find abstract terms, by a sort of magic, metamorphosed into active beings; and it is delightful to trace a general proposition in a pictured event. But allegorical beings should be confined within their own sphere, and never be admitted to mix in the principal action, nor to co-operate in retarding or advancing the catastrophe; which would have a still worse effect than invisible powers. For the impression of real existence, essential to an epic poem, is inconsistent with that figurative existence which is essential to an allegory; and therefore no method can more effectually prevent the impression of reality, than the introduction of allegorical beings co-operating with those whom we conceive to be really existing. The love-episode in the *Henriade* (canto 9.) insufferable by the discordant mixture of allegory with real life, is copied from that of *Rinaldo* and *Armida*, in the *Jerusalem liberata*, which hath no merit to entitle it to be copied. An allegorical object, such as *Fame* in the *Æneid*, and the temple of *Love* in the *Henriade*, may find place in a description: but to introduce *Discord* as a real personage, imploring the assistance of *Love* as another real personage, to enervate the courage of the hero, is making these figurative beings act beyond their sphere, and creating a strange jumble of truth and fiction. The allegory of *Sin* and *Death* in the *Paradise Lost*, is possibly not generally relished, though it is not entirely of the same nature with what we have been condemning: in a work comprehending the achievements of superior beings, there is more room for fancy than where it is confined to human actions.

What is the true notion of an episode? or how is it to be distinguished from the principal action? Every incident that promotes or retards the catastrophe, must be part of the principal action. This clears the nature of an episode; which may be defined, "An incident

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connected with the principal action, but contributing neither to advance nor retard it." The descent of Æneas into hell doth not advance nor retard the catastrophe, and therefore is an episode. The story of Nisus and Euryalus, producing an alteration in the affairs of the contending parties, is a part of the principal action. The family-scene in the sixth book of the *Iliad* is of the same nature; for by Hector's retiring from the field of battle to visit his wife, the Grecians had opportunity to breathe, and even to turn upon the Trojans. The unavoidable effect of an episode according to this definition must be, to break the unity of action; and therefore it ought never to be indulged unless to unbend the mind after the fatigue of a long narration. An episode, when such is its purpose, requires the following conditions: it ought to be well connected with the principal action; it ought to be lively and interesting; it ought to be short; and a time ought to be chosen when the principal action relents (K).

In the following beautiful episode, which closes the second book of *Fingal*, all these conditions are united.

"Comal was a son of Albion; the chief of an hundred hills. His deer drunk of a thousand streams; and a thousand rocks replied to the voice of his dogs. His face was the mildness of youth; but his hand the death of heroes. One was his love, and fair was she! the daughter of mighty Conloch. She appeared like a sun-beam among women, and her hair was like the wing of the raven. Her soul was fixed on Comal, and she was his companion in the chase. Often met their eyes of love, and happy were their words in secret. But Gormal loved the maid, the chief of gloomy Ardven. He watched her lone steps on the heath, the foe of unhappy Comal.

"One day tired of the chase, when the mist had concealed their friends, Comal and the daughter of Conloch met in the cave of Ronan. It was the wonted haunt of Comal. Its sides were hung with his arms; a hundred shields of thong were there, a hundred helms of sounding steel. Rest here, said he, my love Galvina, thou light of the cave of Ronan: a deer appears on Maro's brow; I go, but soon will return. I fear, said she, dark Gormal my foe: I will rest here; but soon return, my love.

"He went to the deer of Mora. The daughter of Conloch, to try his love, clothed her white skin with his armour, and strode from the cave of Ronan. Thinking her his foe, his heart beat high, and his colour changed. He drew the bow: the arrow flew: Galvina fell in blood. He ran to the cave with hasty steps, and called the daughter of Conloch. Where art thou, my love? but no answer.—He marked, at length, her heaving heart beating against the mortal arrow. O Conloch's daughter, is it thou! he sunk upon her breast.

"The hunters found the hapless pair. Many and silent were his steps round the dark dwellings of his love. The fleet of the ocean came: he fought, and the strangers fell: he searched for death over the

field; but who could kill the mighty Comal? Throwing away his shield, an arrow found his manly breast. He sleeps with his Galvina: their green tombs are seen by the mariner, when he bounds on the waves of the north."

24. Next, upon the peculiarities of a *dramatic poem*. And the first we shall mention is a double plot: one of which most resemble an episode in an epic poem; for it would distract the spectator, instead of entertaining him, if he were forced to attend, at the same time, to two capital plots equally interesting. And even supposing it an under-plot like an episode, it seldom hath a good effect in tragedy, of which simplicity is a chief property; for an interesting subject that engages our affections, occupies our whole attention, and leaves no room for any separate concern. Variety is more tolerable in comedy; which pretends only to amuse, without totally occupying the mind. But even there, to make a double plot agreeable, is no slight effort of art: the under-plot ought not to vary greatly in its tone from the principal; for discordant emotions are unpleasant when jumbled together; which, by the way, is an insuperable objection to *tragi-comedy*. Upon that account, the *Provok'd Husband* deserves censure: all the scenes that bring the family of the Wrongheads into action, being ludicrous and farcical, are in a very different tone from the principal scenes, displaying severe and bitter expostulations between Lord Townley and his lady. The same objection touches not the double plot of the *Careless Husband*; the different subjects being sweetly connected, and having only so much variety as to resemble shades of colours harmoniously mixed. But this is not all. The under-plot ought to be connected with that which is principal, so much at least as to employ the same persons: the under-plot ought to occupy the intervals or pauses of the principal action; and both ought to be concluded together. This is the case of the *Merry Wives of Windsor*.

Violent action ought never to be represented on the stage. While the dialogue goes on, a thousand particulars concur to delude us into an impression of reality; genuine sentiments, passionate language, and persuasive gesture: the spectator once engaged, is willing to be deceived, loses sight of himself, and without scruple enjoys the spectacle as a reality. From this absent state, he is roused by violent action: he wakes as from a pleasing dream, and, gathering his senses about him, finds all to be a fiction. Horace delivers the same rule; and founds it upon the same reason:

Ne pueros coram populo Medea trucidet;
Aut humana palam coquat exta nefarius Atreus;
Aut in avem Progne vertatur, Cadmus in anguem:
Quodcumque ostendis mihi sic, incredulus odi.

The French critics join with Horace in excluding blood from the stage; but, overlooking the most substantial objection, they urge only, that it is barbarous and shocking to a polite audience. The Greeks had

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(K) Homer's description of the shield of Achilles is properly introduced at a time when the action relents, and the reader can bear an interruption. But the author of *Telemachus* describes the shield of that young hero in the heat of battle; a very improper time for an interruption.

no notion of such delicacy, or rather effeminaey; witness the murder of Clytemnestra by her son Orestes, passing behind the scene, as represented by Sophocles: her voice is heard calling out for mercy, bitter expostulations on his part, loud shrieks upon her being stabbed, and then a deep silence. An appeal may be made to every person of feeling, whether this scene be not more horrible, than if the deed had been committed in sight of the spectators upon a sudden gust of passion. If Corneille, in representing the affair between Horatius and his sister, upon which the murder ensues behind the scene, had no other view but to remove from the spectators a shocking action, he was guilty of a capital mistake: for murder in cold blood, which in some measure was the case as represented, is more shocking to a polite audience, even where the conclusive stab is not seen, than the same act performed in their presence by violent and unpremeditated passion, as suddenly repented of as committed. Addison's observation is just *, That no part of this incident ought to have been represented, but reserved for a narrative, with every alleviating circumstance in favour of the hero.

* Spectator,
No 44.

25. A few words upon the dialogue, which ought to be so conducted as to be a true representation of nature. We talk not here of the sentiments, nor of the language; (which are treated elsewhere); but of what properly belongs to dialogue-writing; where every single speech, short or long, ought to arise from what is said by the former speaker, and furnish matter for what comes after, till the end of the scene. In this view, all the speeches, from first to last, represent so many links of one regular chain. No author, ancient or modern, possesses the art of dialogue equal to Shakspeare. Dryden, in that particular, may justly be placed as his opposite. He frequently introduces three or four persons speaking upon the same subject, each throwing out his own notions separately, without regarding what is said by the rest: take for an example the first scene of *Aurenzebe*. Sometimes he makes a number club in relating an event, not to a stranger, supposed ignorant of it, but to one another, for the sake merely of speaking: of which notable sort of dialogue, we have a specimen in the first scene of the first part of the *Conquest of Granada*. In the second part of the same tragedy, scene second, the King, Abenamar, and Zulema, make their separate observations, like so many soliloquies, upon the fluctuating temper of the mob: a dialogue so uncouth, puts one in mind of two shepherds in a pastoral, excited by a prize to pronounce verses alternately, each in praise of his own mistress.

This manner of dialogue-writing, beside an unnatural air, has another bad effect: it stays the course of the action, because it is not productive of any consequence. In Congreve's comedies, the action is often suspended to make way for a play of wit.

No fault is more common among writers, than to prolong a speech after the impatience of the person to whom it is addressed ought to prompt him or her to break in. Consider only how the impatient actor is to behave in the mean time. To express his impatience in violent action without interrupting, would be unnatural; and yet to dissimble his impatience by appearing cool where he ought to be highly inflamed,

would be no less so.

Rhyme being unnatural and disgusting in dialogue, is happily banished from our theatre: the only wonder is that it ever found admittance, especially among a people accustomed to the more manly freedom of Shakspeare's dialogue. By banishing rhyme, we have gained so much as never once to dream that there can be any further improvement. And yet, however suitable blank verse may be to elevated characters and warm passions, it must appear improper and affected in the mouths of the lower sort. Why then should it be a rule, That every scene in tragedy must be in blank verse? Shakspeare, with great judgment, has followed a different rule; which is, to intermix prose with verse, and only to employ the latter where it is required by the importance or dignity of the subject. Familiar thoughts and ordinary facts ought to be expressed in plain language: to hear, for example, a footman deliver a simple message in blank verse, must appear ridiculous to every one who is not biased by custom. In short, that variety of characters and of situations, which is the life of a play, requires not only a suitable variety in the sentiments, but also in the diction.

§ 3. The Three Unities.

26. WHEN we consider the chain of causes and effects in the material world, independent of purpose, design, or thought, we find a number of incidents in succession, without beginning, middle, or end: every thing that happens is both a cause and an effect; being the effect of what goes before, and the cause of what follows: one incident may affect us more, another less; but all of them are links in the universal chain: the mind, in viewing these incidents, cannot rest or settle ultimately upon any one; but is carried along in the train without any close.

But when the intellectual world is taken under view, in conjunction with the material, the scene is varied. Man acts with deliberation, will, and choice: he aims at some end; glory, for example, or riches, or conquest, the procuring happiness to individuals, or to his country in general: he proposes means, and lays plans to attain the end proposed. Here are a number of facts or incidents leading to the end in view, the whole composing one chain by the relation of cause and effect. In running over a series of such facts or incidents, we cannot rest upon any one; because they are presented to us as means only, leading to some end: but we rest with satisfaction upon the end or ultimate event; because there the purpose or aim of the chief person or persons is accomplished. This indicates the beginning, the middle, and the end, of what Aristotle calls an *entire action* *.

The story naturally begins with describing those circumstances which move the person who acts the principal part to form a plan, in order to compass some desired event; the prosecution of that plan and the obstructions, carry the reader into the heat of action: the middle is properly where the action is the most involved; and the end is where the event is brought about, and the plan accomplished.

We have given the foregoing example of a plan crowned with success, because it affords the clearest conception of a beginning, a middle, and an end, in which consists *unity* of action; and indeed stricter unity cannot be imagined than in that case. But an action may have

* Poet. c. 6.

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have unity, or a beginning, middle, and end, without so intimate a relation of parts; as where the catastrophe is different from what it is intended or desired, which frequently happens in our best tragedies. In the *Æneid*, the hero, after many obstructions, makes his plan effectual. The *Iliad* is formed upon a different model: it begins with the quarrel between Achilles and Agamemnon; goes on to describe the several effects produced by that cause; and ends in a reconciliation. Here is unity of action, no doubt; a beginning, a middle, and an end; but inferior to that of the *Æneid*: which will thus appear. The mind hath a propensity to go forward in the chain of history; it keeps always in view the expected event; and when the incidents or under-parts are connected by their relation to the event, the mind runs sweetly and easily along them. This pleasure we have in the *Æneid*. It is not altogether so pleasant to connect, as in the *Iliad*, effects by their common cause; for such connection forces the mind to a continual retrospect: looking backward is like walking backward.

If unity of action be a capital beauty in fable imitative of human affairs, a plurality of unconnected fables must be a capital deformity. For the sake of variety, we indulge an under-plot that is connected with the principal: but two unconnected events are extremely unpleasant, even where the same actors are engaged in both. Aristotle is quite licentious in that particular: he carries on at the same time a plurality of unconnected stories. His only excuse is, that his plan is perfectly well adjusted to his subject; for every thing in the *Orlando Furioso* is wild and extravagant.

Though to state facts in the order of time is natural, yet that order may be varied for the sake of conspicuous beauties. If, for example, a noted story, cold and simple in its first movements, be made the subject of an epic poem, the reader may be hurried into the heat of action; reserving the preliminaries for a conversation-piece, if thought necessary; and that method, at the same time, hath a peculiar beauty from being dramatic. But a privilege that deviates from nature ought to be sparingly indulged; and yet romance-writers make no difficulty of presenting to the reader, without the least preparation, unknown persons engaged in some arduous adventure equally unknown. In *Cassandra*, two personages, who afterward are discovered to be the heroes of the fable, start up completely armed upon the banks of the Euphrates, and engage in a single combat.

A play analysed, is a chain of connected facts, of which each scene makes a link. Each scene, accordingly, ought to produce some incident relative to the catastrophe or ultimate event, by advancing or retarding it. A scene that produceth no incident, and for that reason may be termed *barren*, ought not to be indulged, because it breaks the unity of action: a barren scene can never be entitled to a place, because the chain is complete without it. In the *Old Bachelor*, the 3d scene of act 2. and all that follow to the end of that act, are mere conversation-pieces, productive of no consequence. The 10th and 11th scenes, act 3. *Double Dealer*, and the 10th, 11th, 12th, 13th, and 14th scenes, act 1. *Love for Love*, are of the same kind. Neither is *The Way of the World* entirely guiltless of such scenes. It will be no justification, that they help to display

characters: it were better, like Dryden in his *dramatis personæ*, to describe characters beforehand, which would not break the chain of action. But a writer of genius has no occasion for such artifice: he can display the characters of his personages much more to the life in sentiment and action. How successfully is this done by Shakespeare! in whose works there is not to be found a single barren scene.

Upon the whole, it appears, that all the facts in an historical fable, ought to have a mutual connection, by their common relation to the grand event or catastrophe. And this relation, in which the unity of action consists, is equally essential to epic and dramatic compositions.

In handling unity of action, it ought not to escape observation, that the mind is satisfied with lighter unity in a picture than in a poem; because the perceptions of the former are more lively than the ideas of the latter. In Hogarth's *Enraged Musician*, we have a collection of every grating sound in nature, without any mutual connection except that of place. But the horror they give to the delicate ear of an Italian fiddler, who is represented almost in convulsions, bestows unity upon the piece, with which the mind is satisfied.

How far the unities of time and of place are essential, is a question of greater intricacy. These unities were strictly observed in the Greek and Roman theatres; and they are inculcated by the French and English critics, as essential to every dramatic composition. In theory, these unities are also acknowledged by our best poets, though their practice seldom corresponds: they are often forced to take liberties, which they pretend not to justify, against the practice of the Greeks and Romans, and against the solemn decision of their own countrymen. But in the course of this inquiry it will be made evident, that in this article we are under no necessity to copy the ancients; and that our critics are guilty of a mistake, in admitting no greater latitude of place and time than was admitted in Greece and Rome.

Indeed the unities of place and time, are not, by the most rigid critics, required in a narrative poem. In such composition, if it pretend to copy nature, these unities would be absurd; because real events are seldom confined within narrow limits either of place or of time: and yet we can follow history, or an historical fable, through all its changes, with the greatest facility: we never once think of measuring the real time by what is taken in reading; nor of forming any connection between the place of action and that which we occupy.

We are aware, that the drama differs so far from the epic, as to admit different rules. It will be observed, "That an historical fable, intended for reading solely, is under no limitation of time nor of place, more than a genuine history; but that a dramatic composition cannot be accurately represented, unless it be limited, as its representation is, to one place and to a few hours; and therefore that no fable can be admitted but what has these properties, because it would be absurd to compose a piece for representation that cannot be justly represented." This argument has at least a plausible appearance; and yet one is apt to suspect some fallacy, considering that no critic, however strict, has ventured to confine the unities of place and of time within so

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A view of the Grecian drama, compared with our own, may perhaps relieve us from this dilemma: if they be differently constructed, as shall be made evident, it is possible that the foregoing reasoning may not be equally applicable to both. This is an article, that, with relation to the present subject, has not been examined by any writer.

All authors agree, that tragedy in Greece was derived from the hymns in praise of Bacchus, which were sung in parts by a chorus. Thespis, to relieve the singers, and for the sake of variety, introduced one actor; whose province it was to explain historically the subject of the song, and who occasionally represented one or other personage. Eschylus, introducing a second actor, formed the dialogue; by which the performance became dramatic; and the actors were multiplied when the subject represented made it necessary. But still, the chorus, which gave a beginning to tragedy, was considered as an essential part. The first scene, generally, unfolds the preliminary circumstances that lead to the grand event; and this scene is by Aristotle termed the *prologus*. In the second scene, where the action properly begins, the chorus is introduced, which, as originally, continues upon the stage during the whole performance: the chorus frequently makes one in the dialogue; and when the dialogue happens to be suspended, the chorus, during the interval, is employed in singing. Sophocles adheres to this plan religiously. Euripides is not altogether so correct. In some of his pieces it becomes necessary to remove the chorus for a little time: but when that unusual step is risked, matters are so ordered as not to interrupt the representation: the chorus never leave the stage of their own accord, but at the command of some principal personage, who constantly waits their return.

Thus the Grecian drama is a continued representation without any interruption; a circumstance that merits attention. A continued representation without a pause, affords not opportunity to vary the place of action, nor to prolong the time of the action beyond that of the representation. To a representation so confined in place and time, the foregoing reasoning is strictly applicable: a real or feigned action that is brought to a conclusion after considerable intervals of time and frequent changes of place, cannot accurately be copied in a representation that admits no latitude in either. Hence it is, that the unities of place and of time, were, or ought to have been, strictly observed in the Greek tragedies; which is made necessary by the very constitution of their drama, for it is absurd to compose a tragedy that cannot be justly represented.

Modern critics, who for our drama pretend to establish rules founded on the practice of the Greeks, are guilty of an egregious blunder. The unities of place and of time were in Greece, as we see, a matter of necessity, not of choice; and it is easy to show, that if we submit to such fetters, it must be from choice, not necessity. This will be evident upon taking a view of the constitution of our drama, which differs widely from that of Greece; whether more or less perfect, is a different point, to be handled afterward. By dropping the chorus, opportunity is afforded to divide the representation by intervals of time, during which the stage is evacuated and the spectacle suspended. This

qualifies our drama for subjects spread through a wide space both of time and of place: the time supposed to pass during the suspension of the representation, is not measured by the time of the suspension; and any place may be supposed, as it is not in sight: by which means, many subjects can justly be represented in our theatres, that were excluded from those of ancient Greece. This doctrine may be illustrated, by comparing a modern play to a set of historical pictures; let us suppose them five in number, and the resemblance will be complete: each of the pictures resembles an act in one of our plays: there must necessarily be the strictest unity of place and of time in each picture; and the same necessity requires these two unities during each act of a play, because during an act there is no interruption in the spectacle. Now, when we view in succession a number of such historical pictures, let it be, for example, the history of Alexander by Le Brun, we have no difficulty to conceive, that months or years have passed between the events exhibited in two different pictures, though the interruption is imperceptible in passing our eye from the one to the other; and we have as little difficulty to conceive a change of place, however great: in which view, there is truly no difference between five acts of a modern play, and five such pictures. Where the representation is suspended, we can with the greatest facility suppose any length of time or any change of place: the spectator, it is true, may be conscious, that the real time and place are not the same with what are employed in the representation; but this is a work of reflection; and by the same reflection he may also be conscious, that Garrick is not King Lear, that the playhouse is not Dover cliffs, nor the noise he hears thunder and lightning. In a word, after an interruption of the representation, it is not more difficult for a spectator to imagine a new place, or a different time, than, at the commencement of the play, to imagine himself at Rome, or in a period of time two thousand years back. And indeed, it is abundantly ridiculous, that a critic, who is willing to hold candle-light for sunshine, and some painted canvasses for a palace or a prison, should affect so much difficulty in imagining a latitude of place or of time in the fable, beyond what is necessary in the representation.

There are, it must be acknowledged, some effects of great latitude in time that ought never to be indulged in a composition for the theatre: nothing can be more absurd, than at the close to exhibit a full-grown person who appears a child at the beginning: the mind rejects, as contrary to all probability, such latitude of time as is requisite for a change so remarkable. The greatest change from place to place hath not altogether the same bad effect: in the bulk of human affairs place is not material; and the mind, when occupied with an interesting event, is little regardless of minute circumstances: these may be varied at will, because they scarce make any impression.

At the same time, it is not here meant to justify liberty without any reserve. An unbounded licence with relation to place and time, is faulty for a reason that seems to have been overlooked, which is, that it seldom fails to break the unity of action: in the ordinary course of human affairs, single events, such as are fit to be represented on the stage, are confined to a narrow spot, and generally employ no great extent
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of time: we accordingly seldom find strict unity of action in a dramatic composition, where any remarkable latitude is indulged in these particulars. It may even be admitted, that a composition which employs but one place, and requires not a greater length of time than is necessary for the representation, is so much the more perfect; because the confining an event within so narrow bounds, contributes to the unity of action, and also prevents that labour, however slight, which the mind must undergo in imagining frequent changes of place, and many intervals of time. But still we must insist, that such limitation of place and time as was necessary in the Grecian drama, is no rule to us; and therefore, that though such limitation adds one beauty more to the composition, it is at best but a refinement, which may justly give place to a thousand beauties more substantial. And we may add, that it is extremely difficult, if not impracticable, to contract within the Grecian limits, any fable so fruitful of incidents in number and variety as to give full scope to the fluctuation of passion.

It may now appear, that critics who put the unities of place and of time upon the same footing with the unity of action, making them all equally essential, have not attended to the nature and constitution of the modern drama. If they admit an interrupted representation, with which no writer finds fault, it is absurd to reject its greatest advantage, that of representing many interesting subjects excluded from the Grecian stage. If there needs must be a reformation, why not restore the ancient chorus and the ancient continuity of action? There is certainly no medium; for to admit an interruption without relaxing from the strict unities of place and of time, is in effect to load us with all the inconveniencies of the ancient drama, and at the same time to withhold from us its advantages.

And therefore the only proper question is, Whether our model be or be not a real improvement? This indeed may fairly be called in question; and in order to a comparative trial, some particulars must be premised. When a play begins, we have no difficulty to adjust our imagination to the scene of action, however distant it be in time or in place; because we know that the play is a representation only. The case is very different after we are engaged: it is the perfection of representation to hide itself, to impose on the spectator, and to produce in him an impression of reality, as if he were spectator of a real event; but any interruption annihilates that impression, by rousing him out of his waking dream, and unhappily restoring him to his senses. So difficult it is to support the impression of reality, that much slighter interruptions than the interval between two acts are sufficient to dissolve the charm: in the 5th act of the *Mourning Bride*, the three first scenes are in a room of state, the fourth in a prison; and the change is operated by shifting the scene, which is done in a trice: but however quick the transition may be, it is impracticable to impose upon the spectators so as to make them conceive that they are actually carried from the palace to the prison; they immediately reflect, that the palace and prison are imaginary, and that the whole is a fiction.

From these premises, one will naturally be led, at first view, to pronounce the frequent interruptions in

the modern drama to be an imperfection. It will occur, "That every interruption must have the effect to banish the dream of reality, and with it to banish our concern, which cannot subsist while we are conscious that all is a fiction; and therefore, that in the modern drama, sufficient time is not afforded for fluctuation and swelling of passion, like what is afforded in that of Greece, where there is no interruption." This reasoning, it must be owned, has a specious appearance: but we must not become faint-hearted upon the first repulse; let us rally our troops for a second engagement.

Considering attentively the ancient drama, we find, that though the representation is never interrupted, the principal action is suspended not less frequently than in the modern drama: there are five acts in each; and the only difference is, that in the former, when the action is suspended as it is at the end of every act, opportunity is taken of the interval to employ the chorus in singing. Hence it appears, that the Grecian continuity of representation cannot have the effect to prolong the impression of reality: to banish that impression, a pause in the action while the chorus is employed in singing, is no less effectual than a total suspension of the representation.

But to open a larger view, it may be shown, that a representation with proper pauses, is better qualified for making a deep impression, than a continued representation without a pause. This will be evident from the following considerations. Representation cannot very long support an impression of reality; for when the spirits are exhausted by close attention and, by the agitation of passion, an uneasiness ensues, which never fails to banish the waking dream. Now supposing the time that a man can employ with strict attention without wandering, to be no greater than is requisite for a single act, a supposition that cannot be far from truth; it follows, that a continued representation of longer endurance than an act, instead of giving scope to fluctuation and swelling of passion, would overstrain the attention, and produce a total absence of mind. In this respect, the four pauses have a fine effect; for by affording to the audience a reasonable respite when the impression of reality is gone, and while nothing material is in agitation, they relieve the mind from its fatigue; and consequently prevent a wandering of thought at the very time possibly of the most interesting scenes.

In one article, indeed, the Grecian model has greatly the advantage: its chorus, during an interval, not only preserves alive the impressions made upon the audience, but also prepares their hearts finely for new impressions. In our theatres, on the contrary, the audience, at the end of every act, being left to trifle time away, lose every warm impression; and they begin the next act cool and unconcerned, as at the commencement of the representation. This is a gross malady in our theatrical representations; but a malady that luckily is not incurable: to revive the Grecian chorus, would be to revive the Grecian slavery of place and time; but we can figure a detached chorus coinciding with a pause in the representation, as the ancient chorus did with a pause in the principal action. What objection, for example, can there lie against music between the acts, vocal and instrumental, adapted

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ed to the subject? Such detached chorus, without putting us under any limitation of time or place, would recruit the spirits, and would preserve entire the tone, if not the tide, of passion: the music, after an act, should commence in the tone of the preceding passion, and be gradually varied till it accord with the tone of the passion that is to succeed in the next act. The music and the representation would both of them be gainers by their conjunction; which will thus appear. Music that accords with the present tone of mind, is, on that account, doubly agreeable; and accordingly, though music singly hath not power to raise a passion, it tends greatly to support a passion already raised. Further, music prepares us for the passion that follows, by making cheerful, tender, melancholy, or animated impressions, as the subject requires. Take for an example the first scene of the *Mourning Bride*, where soft music, in a melancholy strain, prepares us for Almeria's deep distress. In this manner, music and representation support each other delightfully; the impression made upon the audience by the representation, is a fine preparation for the music that succeeds; and the impression made by the music, is a fine preparation for the representation that succeeds. It appears evident, that by some such contrivance, the modern drama may be improved, so as to enjoy the advantage of the ancient chorus without its slavish limitation of place and time. But to return to the comparison between the ancient and the modern drama.

The numberless improprieties forced upon the Greek dramatic poets by the constitution of their drama, may be sufficient, one should think, to make us prefer the modern drama, even abstracting from the improvement proposed. To prepare the reader for this article, it must be premised, that as in the ancient drama the place of action never varies, a place necessarily must be chosen, to which every person may have access without any improbability. This confines the scene to some open place, generally the court or area before a palace; which excludes from the Grecian theatre transactions within doors, though these commonly are the most important. Such cruel restraint is of itself sufficient to cramp the most pregnant invention; and accordingly the Greek writers, in order to preserve unity of place, are reduced to woful improprieties. In the *Hippolytus* of Euripides, (act 1. sc. 6.) Phedra, distressed in mind and body, is carried without any pretext from her palace to the place of action; is there laid upon a couch, unable to support herself upon her limbs; and made to utter many things improper to be heard by a number of women who form the chorus: and what is still more improper, her female attendant uses the strongest intreaties to make her reveal the secret cause of her anguish; which at last Phedra, contrary to decency and probability, is prevailed upon to do in presence of that very chorus, (act 2. sc. 2.) Alceste, in Euripides, at the point of death, is brought from the palace to the place of action, groaning, and lamenting her untimely fate (act 2. sc. 1.) In the *Trachinians* of Sophocles, (act 2.), a secret is imparted to Dejanira, the wife of Hercules, in presence of the chorus. In the tragedy of *Iphigenia*, the messenger employed to inform Clitemnestra that Iphigenia was sacrificed, stops short at the place of action, and with a loud voice calls the

queen from her palace to hear the news. Again, in the *Iphigenia in Tauris* (act 4.), the necessary presence of the chorus forces Euripides into a gross absurdity, which is to form a secret in their hearing; and, to disguise the absurdity, much court is paid to the chorus, not one woman but a number, to engage them to secrecy. In the *Medea* of Euripides, that princess makes no difficulty, in presence of the chorus, to plot the death of her husband, of his mistress, and of her father the king of Corinth, all by poison: it was necessary to bring Medea upon the stage; and there is but one place of action, which is always occupied by the chorus. This scene closes the second act; and in the end of the third, she frankly makes the chorus her confidants in plotting the murder of her own children. Terence, by identity of place, is often forced to make a conversation within doors be heard on the open street: the cries of a woman in labour are there heard distinctly.

The Greek poets are not less hampered by unity of time than by that of place. In the *Hippolytus* of Euripides, that prince is banished at the end of the 4th act; and in the first scene of the following act, a messenger relates to Theseus the whole particulars of the death of Hippolytus by the sea-monster: that remarkable event must have occupied many hours; and yet in the representation it is confined to the time employ'd by the chorus upon the song at the end of the 4th act. The inconsistency is still greater in the *Iphigenia in Tauris* (act 5. sc. 4.): the song could not exhaust half an hour; and yet the incidents supposed to have happened during that time, could not naturally have been transacted in less than half a day.

The Greek artists are forced, not less frequently, to transgress another rule, derived also from a continued representation. The rule is, that as a vacuity, however momentary, interrupts the representation, it is necessary that the place of action be constantly occupied. Sophocles, with regard to that rule as well as to others, is generally correct: but Euripides cannot bear such restraint; he often evacuates the stage, and leaves it empty for others. *Iphigenia in Tauris*, after pronouncing a soliloquy in the first scene, leaves the place of action, and is succeeded by Orestes and Pylades: they, after some conversation, walk off; and Iphigenia re-enters, accompanied with the chorus. In the *Alcestes*, which is of the same author, the place of action is void at the end of the 3d act. It is true, that to cover the irregularity, and to preserve the representation in motion, Euripides is careful to fill the stage without loss of time: but this still is an interruption, and a link of the chain broken; for during the change of the actors, there must be a space of time, during which the stage is occupied by neither set. It makes indeed a more remarkable interruption, to change the place of action as well as the actors; but that was not practicable upon the Grecian stage.

It is hard to say upon what model Terence has formed his plays. Having no chorus, there is a pause in the representation at the end of every act: but advantage is not taken of the cessation, even to vary the place of action; for the street is always chosen, where every thing passing may be seen by every person; and by that choice, the most sprightly and interesting parts of the action, which commonly pass within doors,

are

The three
Unities.

are excluded; witness the last act of the *Eunuch*. He hath submitted to the like slavery with respect to time. In a word, a play with a regular chorus, is not more confined in place and time than his plays are. Thus a zealous sectary follows implicitly ancient forms and ceremonies, without once considering whether their introductive cause be still subsisting. Plautus, of a bolder genius than Terence, makes good use of the liberty afforded by an interrupted representation: he varies the place of action upon all occasions, when the variation suits his purpose.

The intelligent reader will by this time understand, that we plead for no change of place in our plays but after an interval, nor for any latitude in point of time but what falls in with an interval. The unities of place and time ought to be strictly observed during each act; for during the representation, there is no opportunity for the smallest deviation from either. Hence it is an essential requisite, that during an act the stage be always occupied; for even a momentary vacancy makes an interval or interruption. Another rule is no less essential: it would be a gross breach of the unity of action, to exhibit upon the stage two separate actions at the same time; and therefore, to preserve that unity, it is necessary that each personage introduced during an act, be linked to those in possession of the stage, so as to join all in one action. These things follow from the very conception of an act, which admits not the slightest interruption: the moment the representation is intermitted, there is an end of that act; and we have no other notion of a new act, but where, after a pause or interval, the representation is again put in motion. French writers, generally speaking, are correct in this particular. The English, on the contrary, are so irregular as scarce to deserve a criticism: actors not only succeed each other in the same place without connection, but, what is still less excusable, they frequently succeed each other in different places. This change of place in the same act, ought never to be indulged; for, beside breaking the unity of the act, it has a disagreeable effect: after an interval, the imagination adapts itself to any place that is necessary, as readily as at the commencement of the play; but during the representation, we reject change of place. From the foregoing censure must be excepted the *Mourning Bride* of Congreve, where regularity concurs with the beauty of sentiment and of language, to make it one of the most complete pieces England has to boast of. It is to be acknowledged, however, that, in point of regularity, this elegant performance is not altogether unexceptionable. In the four first acts, the unities of place and time are strictly observed: but in the last act, there is a capital error with respect to unity of place; for in the three first scenes of that act, the place of action is a room of state, which is changed to a prison in the fourth scene: the chain also of the actors is broken; as the persons introduced in the prison, are different from those who made their appearance in the room of state. This remarkable interruption of the representation, makes in effect two acts instead of one: and therefore, if it be a rule that a play ought not to consist of more acts than five, this performance is so far defective in point of regularity. It may be added, that, even admitting six acts, the irregularity

would not be altogether removed, without a longer pause in the representation than is allowed in the acting; for more than a momentary interruption is requisite for enabling the imagination readily to fall in with a new place, or with a wide space of time. In *The Way of the World*, of the same author, unity of place is preserved during every act, and a stricter unity of time during the whole play than is necessary.

§ 4. Of the Opera.

51. AN opera is a drama represented by music. This entertainment was invented at Venice. An exhibition of this sort requires a most brilliant magnificence, and an expence truly royal. The drama must necessarily be composed in verse; for as operas are sung and accompanied with symphonies, they must be in verse to be properly applicable to music. To render this entertainment still more brilliant, it is ornamented with dances and balletes, with superb decorations, and surprising machinery. The dresses of the actors, of those who assist in the chorus, and of the dancers, being all in the most splendid and elegant taste, contribute to render the exhibition highly sumptuous. But notwithstanding this union of arts and pleasures at an immense expence, and notwithstanding a most dazzling pageantry, an opera appears, in the eyes of many people of taste, but as a magnificent absurdity, seeing that nature is never there from the beginning to the end. It is not our business here, however, to determine between the different tastes of mankind.

The method of expressing our thoughts by singing and music is so little natural, and has something in it so forced and affected, that it is not easy to conceive how it could come into the minds of men of genius to represent any human action; and, what is more, a serious or tragic action, any otherwise than by speech. We have, it is true, operas in English by Addison; &c. in Italian by Metastasio, in French by M. Quinault, Fontenelle, &c. the subjects of which are so grave and tragic, that one might call them musical tragedies, and *real chefs-d'œuvres* in their kind. But though we are highly satisfied and greatly affected on reading them, and are much pleased with seeing them represented, yet the spectator is, perhaps, more charmed with the magnificence of the light and the beauty of the music, then moved with the action and the tragical part of the performance. We are not, however, of that order of critics who strive to prove, that mankind act wrong in finding pleasure in an object with which they are really pleased; who blame a lover for thinking his mistress charming, when her features are by no means regular; and who are perpetually applying the rules of logic to the works of genius: we make these observations merely in order to examine if it be not possible to augment the pleasures of a polite people, by making the opera something more natural, more probable, and more consonant to reason.

We think, therefore, that the poet should never, or at least very rarely, choose a subject from history, but from fable or mythology, or from the regions of enchantment. Every rational mind is constantly shocked to hear a mutilated hero trill out, from the slender pipe of a chaffinch, *To arms! To arms!* and in the

same tone animate his soldiers, and lead them to the assault; or harangue an assembly of grave senators, and sometimes a whole body of people. Nothing can be more burlesque than such exhibitions; and a man must be possessed of a very uncommon sensibility to be affected by them. But as we know not what was the language of the gods, and their manner of expressing themselves, we are at liberty in that case to form what illusions we please, and to suppose that they sung to distinguish themselves from mortals. Besides, all the magic of decorations and machinery become natural, and even necessary, in these kinds of subjects; and therefore readily afford opportunity for all the pomp of these performances. The chorus, the dances, the ballets, the symphonies and dresses, may likewise be all made to correspond with such subjects: nothing is here affected, absurd, or unnatural. Whoever is possessed of genius, and is well acquainted with mythology, will there find an inexhaustible source of subjects highly diversified, and quite proper for the drama of an opera.

We shall not speak here of that sort of music which appears to us the most proper for such a drama, and of the several alterations of which we think it susceptible, in order to make it more complete, and to adapt it to a more pathetic, more noble, and more natural expression, as well in the recitatives, as in the airs and chorus. We have only here to consider the business of the poet. He should never lose sight of nature, even in the midst of the greatest fiction. A god, a demi-god, a renowned hero, such for example as Renaud in *Armida*, a fairy, a genie, a nymph, or fury, &c. should constantly be represented according to the characters we give them, and never be made to talk the language of a fop or a *petite maitresse*. The recitative, which is the ground-work of the dialogue, requires verses that are free and not regular, such as with a simple cadence approach the nearest to common language. The airs should not be forced into the piece, nor improperly placed for the sake of terminating a scene, or to display the voice of a performer: they should express some sentiment, or some precept, short and striking, or tender and affecting; or some simile lively and natural; and they should arise of themselves from a monologue, or from a scene between two persons: prolixity should here be particularly avoided, especially when such an air makes part of a dialogue; for nothing is more insipid or disgusting than the countenances of the other actors who appear at the same time, whose silence is quite unmeaning, and who know not what to do with their hands and feet while the singer is straining his throat. The verse of all the airs should be of the lyric kind, and should contain some poetic image, or paint some noble passion, which may furnish the composer with an opportunity of displaying his talents, and of giving a lively and affecting expression to the music. A phrase that is inanimated can never have a good effect in the performance, but must become insipid and horribly tedious in the air. The trite similes of the Italians of a stream that flows, or a bird that flies, &c. are no longer sufferable. The same thing may be said with regard to the chorus, which should be equally natural and well adapted: it is here sometimes a whole people, sometimes the inhabitants of a peculiar country,

and sometimes warriors, nymphs, or priests, &c. who raise their voice to demand justice, to implore favour, or render a general homage. The action itself will furnish the poet of genius with ideas, words, and the manner of disposing them.

Lastly, the opera being a performance calculated less to satisfy the understanding, than to charm the ear and affect the heart, and especially to strike the sight, the poet should have a particular attention to that object, should be skilled in the arts of a theatre, should know how to introduce combats, ballets, feasts, games, pompous entries, solemn processions, and such marvellous incidents as occur in the heavens, upon earth, in the sea, and even in the infernal regions: but all these matters demand a strong character, and the utmost precision in the execution; for otherwise, the comic being a near neighbour to the sublime, they will easily become ridiculous. The unity of action must certainly be observed in such a poem, and all the incidental episodes must concur to the principal design; otherwise it would be a monstrous chaos. It is impossible, however, scrupulously to observe the unity of time and place: though the liberty, which reason allows the poet in this respect, is not without bounds; and the less use he makes of it, the more perfect his poem will be. It is not perhaps impossible so to arrange the objects, that, in changing the decorations, the painter may constantly make appear some part of the principal decoration which characterises the situation of the scene, as the corner of a palace at the end of a garden, or some avenue that leads to it, &c. But all this is liable to difficulties, and even to exceptions; and the art of the painter must concur in such case with that of the poet. For the rest, all the operas of Europe are at least one third too long; especially the Italian. The unity of action requires brevity; and satiety is inseparable from a diversion that lasts full four hours, and sometimes longer. They have indeed endeavoured to obviate this inconvenience by dividing an opera into three, and even into five acts; but experience proves, that this division, though judicious, is still not sufficient to relieve the wearied attention.

SECT. II. Of Lyric Poetry.

52. THE ode is very ancient, and was probably the first species of poetry. It had its source, we may suppose, from the heart, and was employed to express, with becoming fervour and dignity, the grateful sense man entertained of the blessings which daily flowed from God the fountain of all goodness: Hence their harvest hymns, and other devotional compositions of that kind.

But in process of time it was employed, not only to praise the Almighty for bounties received, but to solicit his aid in time of trouble; as is plain from the odes written by king David and others, and collected by the Jewish Sanhedrim into the book of *Psalms*, to be sung at their fasts, festivals, and on other solemn occasions. Nor was this practice confined to the *Israelites* only: Other nations had their songs of praise and petitions of this sort, which they preferred to their deities in time of public prosperity and public distress, as well as to those heroes who distinguished themselves in arms. Even the *American Indians*, whose notions

of religion are extremely confined, have their war-songs, which they sing to this day.

It is reasonable to suppose that the awful purpose to which the ode was applied, gave rise among the ancients to the custom of invoking the muses; and that the poets, in order to raise their sentiments and language, so as to be acceptable to their deities, thought it expedient to solicit some divine assistance. Hence poets are said to have been inspired, and hence an unbounded liberty has been given to the ode; for the lyric poet, fired, as it were, with his subject, and borne away on the wings of gratitude, disdains grammatical niceties and common modes of speech, and often soars above rule, though not above reason. This freedom, however, consists chiefly in sudden transitions, bold digressions, and lofty excursions. For the ancient poets, and even Pindar, the most daring and lofty of them all, has in his sublimest flights, and amidst all his rapture, preserved harmony, and often uniformity in his versification; but so great is the variety of his measures, that the traces of sameness are in a manner lost; and this is one of the excellencies for which that poet is admired, and which, though seemingly devoid of art, requires so much that he has seldom been imitated with success.

The ancients in their odes indulged such a liberty of fancy, that some of their best poets not only make bold excursions and digressions, but, having in their flights started some new and noble thought, they frequently pursue it, and never more return to their subject. But this loose kind of ode, which seems to reject all method, and in which the poet, having just touched upon his subject, immediately diverts to another, we should think blameable, were it lawful to call in question the authority of those great men who were our preceptors in this art. We may venture to affirm, however, that these compositions stand in no degree of comparison with other odes of theirs; in which, after wandering from the subject in pursuit of new ideas arising from some of its adjuncts, and ranging wantonly, as it were, through a variety of matter, the poet is, from some other circumstance, led naturally to his subject again; and, like a bee, having collected the essence of many different flowers, returns home and unites them all in one uniform pleasing sweet.

The ode among the ancients signified no more than a song; but with the moderns, the ode and the song are considered as different compositions; the ode being usually applied in grave and lofty subjects, and seldom song but on solemn occasions.

The subjects most proper for the ode and song, Horace has pointed out in a few elegant lines.

Gods, heroes, conquerors, *Olympic* crowns,
Love's pleasing cares, and the free joys of wine,
Are proper subjects for the lyric song.

To which we may add, that happiness, the pleasures of a rural life, and such parts of morality as afford lessons for the promotion of our felicity, and reflections on the conduct of life, are equally suitable to the ode. This both *Pindar* and *Horace* were so sensible of, that many of their odes are seasoned with these moral sentences and reflections.

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But who can number ev'ry fandy grain
Wash'd by *Sicilia's* hoarse-rebounding main?
Or who can *Theron's* gen'rous works expels,
And tell how many hearts his bounteous virtues blest?

Ode to IHERON.

And in another *Olympic* ode, inscribed by the same poet to *Diagoras* of *Rhodes* (and in such esteem, that it was deposited in the temple of *Minerva*, written in letters of gold), *Pindar*, after exalting them to the skies, concludes with this lesson in life:

Yet as the gales of fortune various blow,
To day tempestuous, and to-morrow fair,
Due bounds, ye *Rhodians*, let your transports know;
Perhaps to-morrow comes a storm of care.

West's PINDAR.

The man resolv'd and steady to his trust,
Inflexible to ill, and obstinately just,
May the rude rabble's insolence despise,
Their senseless clamours and tumultuous cries;
The tyrant's fierceness he beguiles,
And the stern brow and the harsh voice defies,
And with superior greatness smiles.

Not the rough whirlwind, that deforms
Adria's black gulf, and vexes it with storms,
The stubborn virtue of his soul can move;
Nor the red arm of angry *Jove*,
That sings the thunder from the sky,
And gives it rage to roar and strength fly.
Should the whole frame of nature round him break,
In ruin and confusion hurl'd,
He unconcern'd would hear the mighty crack,
And stand secure amidst a falling world.

HORACE.

M. Despreaux has given us a very beautiful and just description of the ode in these lines.

L'Ode avec plus d'éclat, & non moins d'énergie
Elevant jusqu'au ciel son vol ambitieux,
Entretient dans vers commerce avec les Dieux.
Aux Athletes dans Pise elle ouvre la barrière,
Chante un vainqueur poudreux au bout de la carrière;
Mene Achille sanglant au bords du Simois
Ou fait flechir l'Escaut sous le joug de Louis.
Tantôt comme une abeille ardente à son ouvrage
Elle s'en va de fleurs dépouiller le rivage:
Elle peint les festins, les danses & les ris,
Vante un baiser cueilli sur les lèvres d'Iris,
Qui mollement résiste & par un doux caprice
Quelquefois le refuse, afin qu'on le ravisse.
Son style impetueux souvent marche au hasard.
Chez elle un beau desordre est un effet de Part,
Loin ces rimeurs craintifs, dont l'esprit plegmatique
Garde dans ses fureurs un ordre didactique:
Qui chantant d'un héros les progrès éclatans,
Maigres historiens, suivront l'ordre des temps.
Apollon de son feu leur fut toujours avare, &c.

The lofty ode demands the strongest fire,
For there the muse all Phœbus must inspire:
Mounting to heav'n in her ambitious flight,
Amongst the Gods and heroes takes delight;
Of Pisa's wrestlers tells the sinewy force,
And sings the dusty conqueror's glorious course;

To Simois' banks now fierce Achilles sends,
Beneath the Gallic yoke now Escutac bends :
Sometimes she flies, like an industrious bee,
And robs the flow'rs by nature's chemistry;
Describes the shepherds dances, feasts, and bliss,
And boasts from Phillis to surprize a kiss,
When gently she refits with feign'd remorse,
That what the grants may seem to be by force.
Her generous style will oft at random start
And by a brave disorder show her art ;
Unlike those fearful poets whose cold rhyme
In all their raptures keeps exactest time,
Who sing the illustrious hero's mighty praise,
Dry journalists, by terms of weeks and days ;
To these, Apollo, thrifty of his fire,
Denies a place in the Pierian choir, &c.

SOAMES.

The variety of subjects, which are allowed the *lyric* poet, makes it necessary to consider this species of poetry under the following heads, viz. the *sublime* ode, the *lesser* ode, and the *song*. We shall begin with the lowest, and proceed to that which is more eminent.

54. I. *Songs* are little poetical compositions, usually set to a tune, and frequently sung in company by way of entertainment and diversion. Of these we have in our language a great number; but, considering that number, not many which are excellent; for, as the duke of Buckingham observes,

Tho' nothing seems more easy, yet no part
Of poetry requires a nicer art.

The song admits of almost any subject; but the greatest part of them turn either upon *love*, *contentment*, or the *pleasures of a country life*, and *drinking*. Be the subject, however, what it will, the verses should be easy, natural, and flowing, and contain a certain harmony, so that poetry and music may be agreeably united. In these compositions, as in all others, obscene and profane expressions should be carefully avoided, and indeed every thing that tends to take off that respect which is due to religion and virtue, and to encourage vice and immorality. As the best songs in our language are already in every hand, it would seem superfluous to insert examples. For further precepts, however, as well as select examples, in this species of composition, we may refer the reader to the elegant *Essay on Song writing*, by Mr Aikin.

55. II. The *lesser ode*. The distinguishing character of this is sweetness; and as the pleasure we receive from this sort of poem, arises principally from its soothing and affecting the passions, great regard should be paid to the language, as well as to the thoughts and numbers.

The expression should be easy, fancy high ;
Yet that not seem to creep, nor this to fly :
No words transpos'd, but in such order all,
As, tho' hard wrought, may seem by chance to fall.

D. Buckingham's *Essay*.

The style, indeed, should be easy : but it may be also florid and figurative. It solicits delicacy, but disdains affectation. The thoughts should be natural, chaste, and elegant; and the numbers various, smooth, and harmonious. A few examples will sufficiently explain what we mean.

Longinus has preserved a fragment of *Sappho*, an ancient Greek poetess, which is in great reputation amongst the critics, and has been so happily translated by Mr Philips, as to give the English reader a just idea of the spirit, ease, and elegance of that admired author; and show how exactly the copied nature. To enter into the beauties of this ode, we must suppose a lover sitting by his mistress, and thus expressing his passion :

Blest as th' immortal gods is he,
The youth who fondly fits by thee,
And sees and hears thee all the while
Softly speak, and sweetly smile.
'Twas this depriv'd my soul of rest,
And rais'd such tumults in my breast ;
For while I gaz'd, in transport tost,
My breath was gone, my voice was lost.
My bosom glow'd, the subtle flame
Ran quick through all my vital frame :
O'er my dim eyes a darkness hung ;
My ears with hollow murmurs rung.
In dewy damps my limbs were chill'd ;
My blood with gentle horrors thrill'd ;
My feeble pulse forgot to play ;
I fainted, sunk, and dy'd away.

After this instance of the *Sapphic* ode, it may not be improper to speak of that sort of ode which is called *Anacreontic*; being written in the manner and taste of *Anacreon*, a Greek poet, famous for the delicacy of his wit, and the exquisite, yet easy and natural turn of his poetry. We have several of his odes still extant, and many modern ones in imitation of him, which are mostly composed in verses of seven syllables, or three feet and a half.

We shall give the young student one or two examples of his manner from Mr Fawkes's excellent translation.

The following ode on the power of gold, which had been often attempted with but little success, this gentleman has translated very happily.

Love's a pain that works our wo ;
Not to love, is painful too :
But, alas ! the greatest pain
Waits the love that meets disdain.

What avails ingenious worth,
Sprightly wit, or noble birth ?
All these virtues useless prove ;
Gold alone engages love.

May he be completely curs'd,
Who the sleeping mischief first
Wak'd to life, and, vile before,
Stamp'd with worth the sordid ore.
Gold creates in brethren strife ;
Gold destroys the parent's life ;
Gold produces civil jars,
Murders, massacres, and wars ;
But, the worst effect of gold,
Love, alas ! is bought and sold.

His ode on the vanity of riches, is of a piece with the above, and conveys a good lesson to those who are over anxious for wealth.

If the treasur'd gold could give
Man a longer term to live,

I'd employ my utmost care
Still to keep, and still to spare;
And, when death approach'd, would say,
'Take thy fee, and walk away.'

But since riches cannot save
Mortals from the gloomy grave,
Why should I myself deceive,
Vainly sigh, and vainly grieve?
Death will surely be my lot,
Whether I am rich or not.

Give me freely while I live
Generous wines, in plenty give
Soothing joys my life to cheer,
Beauty kind, and friends sincere;
Happy! could I ever find
Friends sincere, and beauty kind.

But two of the most admired, and perhaps the most imitated, of Anacreon's odes, are that of Mars wounded by one of the darts of Love, and Cupid stung by a Bee; both which are wrought up with fancy and delicacy, and are translated with elegance and spirit.—Take that of Cupid stung by a bee.

Once as Cupid, tir'd with play,
On a bed of roses lay,
A rude bee, that slept unseen,
The sweet-breathing buds between,
Stung his finger, cruel chance!
With its little pointed lance.
Strait he fills the air with cries,
Weeps, and sobs, and runs, and flies;
'Till the god to Venus came,
Lovely, laughter-loving dame:
Then he thus began to plain;
"Oh! undone,—I die with pain—"
"Dear mamma, a serpent small,
Which a Bee the ploughmen call,
Imp'd with wings, and arm'd with dart,
"Oh!—has stung me to the heart."
Venus thus reply'd, and smil'd:
'Dry those tears for shame! my child;
'If a bee can wound so deep,
'Causing Cupid thus to weep,
'Think, O think! what cruel pains
'He that's stung by thee sustains.'

Mr Prior, whose poetical works will be ever admired for the natural ease and elegance of his style, as well as for the delicacy of his wit, has in several of his odes the very spirit and air of Anacreon. The following ode, in which he describes the effects of love, and insinuates that the eyes are the best interpreters of the heart, is written exactly in his manner.

The merchant, to secure his treasure,
Conveys it in a burrow'd name;
Euphelia serves to grace my measure;
But Chloe is my real flame.
My softest verse, my darling lyre,
Upon Euphelia's toilet lay;
When Chloe noted her desire,
That I should sing, that I should play.
My lyre I tune, my voice I raise;
But with my numbers mix my sighs;
And whilst I sing Euphelia's praise,
I fix my soul on Chloe's eyes.

Fair Chloe blusht: 'Euphelia frown'd;
I sung and gaz'd; I play'd and trembled:
And Venus, to the Loves around,
Remark'd how ill we all dissembled.

This ingenious author has given us several odes in the spirit and manner of Horace, as well as of Anacreon; and the following *Answer to Chloe jealous*, which was written when he was sick, has much of the elegant tenderness of Sappho.

Yes, fairest proof of beauty's pow'r,
Dear idol of my panting heart,
Nature points this my fatal hour:
And I have liv'd; and we must part.
While now I take my last adieu,
Heave thou no sigh, nor shed a tear;
Left yet my half-clos'd eye may view
On earth an object worth its care.
From jealousy's tormenting strife
For ever be thy bosom freed;
That nothing may disturb thy life,
Content I harken to the dead.
Yet when some better-fated youth
Shall with his am'rous parly move thee,
Reflect one moment on thy truth
Who, dying, thus persists to love thee.

And in the piece which immediately follows, intitled, *A better Answer to Chloe jealous*, he has, together with the gaiety and wit of Anacreon and Horace, blended some strokes of humour.

Dear Chloe, how blubber'd is that pretty face?
Thy cheek all on fire, and thy hair all uncurl'd:
Prithee quit this caprice; and (as old Falstaff lays)
Let us e'en talk a little like folks of this world.
How canst thou presume thou hast leave to destroy
The beauties which Venus but lent to thy keeping?
Those looks were design'd to inspire love and joy:
More ordinary eyes may serve people for weeping.
To be vex'd at a trifle or two that I writ,
Your judgment at once and my passion you wrong:
You take that for fact, which will scarce be found wit:
Od's life! must one swear to the truth of a song?
What I speak, my fair Chloe, and what I write, shows
The difference there is betwixt nature and art:
I court others in verse; but I love thee in prose;
And they have my whimsies, but thou hast my heart.
The god of us verse-men (you know, child) the Sun,
How after his journeys he lets up his rest;
If at morning o'er earth 'tis his fancy to run,
At night he reclines on his Thetis's breast.
So when I am weary'd with wand'ring all day,
To thee, my delight, in the evening I come;
No matter what beauties I saw in my way,
They were but my visits, but thou art my home.
Then hush, dear Chloe, this pastoral war,
And let us like Horace and Lydia agree;
For thou art a girl as much brighter than her,
As he was a poet sublimer than me.

There is much of the softness of Sappho, and the sweetness of Anacreon and Prior, in the following odes: which is ascribed to the late unfortunate Dr Dodd, and was written in compliment to a lady, who, being sick, had sent the author a moss rose-bud, instead
of

of making his family a visit. This piece is particularly to be esteemed for the just and striking moral with which it is pointed.

The slightest of favours bestow'd by the fair,
With rapture we take, and with triumph we wear:
But a moss-woven rose bud, Eliza, from thee,
A well-pleasing gift to a monarch would be.
—Ah! that illness, too cruel, forbidding thou'd stand,
And refuse me the gift from thy own lovely hand!
With joy I receive it, with pleasure will view,
Reminded of thee, by its odour and hue:
“Sweet rose, let me tell thee, tho' charming thy bloom,
Tho' thy fragrance excels Seba's richest perfume;
Thy breath to Eliza's no fragrance hath in't,
And but dull is thy bloom to her cheek's blushing tint.
Yet, alas! my fair flow'r, that bloom will decay,
And all thy lov'd beauties soon wither away;
Tho' pluck'd by her hand, to whose touch, we must own,
Harsh and rough is the cygnet's most delicate down:”
Thou too, snowy hand;—nay, I mean not to preach;
But the rose, lovely moralist, suffer to teach.
“Extol not, fair maiden, thy beauties o'er mine;
They too are short-liv'd, and they too must decline;
And small, in conclusion, the diff'rence appears,
In the bloom of few days, or the bloom of few years!
But remember a virtue the rose hath to boast,
—Its fragrance remains when its beauties are lost!”

56. We come now to those odes of the more florid and figurative kind, of which we have many in our language that deserve particular commendation. Mr Warton's Ode to Fancy has been justly admired by the best judges; for though it has a distant resemblance of Milton's L'Allegro and Il Penseroso, yet the work is original; the thoughts are mostly new and various, and the language and numbers elegant, expressive, and harmonious.

O parent of each lovely muse,
Thy spirit o'er my soul diffuse!
O'er all my artless songs preside,
My footsteps to thy temple guide!
To offer at thy turf-built shrine
In golden cups no costly wine,
No murder'd fating of the flock,
But flow'rs and honey from the rock.
O nymph, with lockily flowing hair,
With buskin'd leg, and bosom bare;
Thy waist with myrtle-girdle bound,
Thy brows with Indian feathers crown'd;
Waving in thy snowy hand
An all-commanding magic wand,
Of pow'r to bid fresh gardens blow
‘Mid cheerless Lapland's barren snow;
Whose rapid wings thy flight convey,
Thro' air, and over earth and sea;
While the vast various landscape lies
Conspicuous to thy piercing eyes.
O lover of the desert, hail!
Say, in what deep and pathless vale,
Or on what hoary mountain's side,
‘Midst falls of water, you reside;
‘Midst broken rocks, a rugged scene,
With green and grassy dales between;

‘Midst forests dark of aged oak,
Ne'er echoing with the woodman's stroke;
Where never human art appear'd,
Nor ev'n one straw-roof'd cott was rear'd;
Where Nature seems to sit alone,
Majestic on a craggy throne.
Tell me the path, sweet wand'rer! tell,
To thy unknown sequester'd cell,
Where woodbines cluster round the door,
Where shells and moss o'erlay the floor;
And on whose top an hawthorn blows,
Amid whose thickly-woven boughs
Some nightingale still builds her nest,
Each ev'ning warbling thee to rest.
Then lay me by the haunted stream,
Wrapt in some wild, poetic dream;
In converse while methinks I rove
With Spenser thro' a fairy grove;
Till suddenly awak'd, I hear
Strange whisper'd music in my ear;
And my glad soul in bliss is drown'd,
By the sweetly-soothing found I
Me, goddess, by the right-hand lead,
Sometimes thro' the yellow mead;
Where Joy and white rob'd Peace resort,
And Venus keeps her festive court;
Where Mirth and Youth each ev'ning meet,
And lightly trip with nimble feet,
Nodding their lily-crown'd heads,
Where Laughter rose-lip'd Hebe leads;
Where Echo walks steep hills among,
Lift'ning to the shepherd's song.
Yet not these flow'ry fields of joy,
Can long my pensive mind employ;
Hail, Fancy, from the scenes of Folly,
To meet the matron Melancholy!
Goddess of the tearful eye,
That loves to fold her arms and sigh.
Let us with silent footsteps go
To charnels, and the house of woe;
To Gothic churches, vaults, and tombs,
Where each sad night some virgin comes,
With throbbing breast and faded cheek,
Her promis'd bridegroom's urn to seek:
Or to some abbey's mould'ring towers,
Where, to avoid cold wintry show'rs,
The naked beggar shivering lies,
While whistling tempests round her rise,
And trembles lest the tot'ring wall
Should on her sleeping infants fall.
Now let us louder strike the lyre,
For my heart glows with martial fire;
I feel, I feel, with sudden heat,
My big tumultuous bosom beat;
The trumpet's clangours pierce my ear,
A thousand widows shrieks I hear:
Give me another horse, I cry;
Lo, the base Gallic squadrons fly!
Whence is this rage?—what spirit, say,
To battle hurries me away?
‘Tis Fancy, in her fiery car,
Transports me to the thickest war;
There whirls me o'er the hills of slain,
Where tumult and destruction reign;

Where,

Where, mad with pain, the wounded steed,
Tramples the dying and the dead;
Where giant Terror stalks around,
With fullen joy surveys the ground,
And, pointing to th' ensanguin'd field,
Shakes his dreadful gorgon shield!
O guide me from this horrid scene
To high-arch'd walks, and alleys green,
Which lovely Laura seeks; to shun
The fervors of the mid-day sun.
The pangs of absence, O remove,
For thou can'st place me near my love;
Can'st fold in visionary bliss,
And let me think I steal a kiss;
While her ruby lips dispense
Luscious nectar's quintessence!
When young-ey'd Spring profusely throws
From her green lap the pink and rose;
When the lost turtle of the dale
To Summer tells her tender tale;
When Autumn cooling caverns seeks,
And stains with wine his jolly cheeks;
When Winter, like poor pilgrim old,
Shakes his silver beard with cold;
At ev'ry season, let my ear
Thy solemn whispers, Fancy, hear.
O warm enthusiastic maid!
Without thy pow'rful, vital aid,
That breathes an energy divine,
That gives a soul to ev'ry line,
Ne'er may I strive with lips profane,
To utter an unhallow'd strain;
Nor dare to touch the sacred string,
Save when with smiles thou bid'st me sing.
O hear our pray'r, O hither come
From thy lamented Shakespeare's tomb,
On which thou lov'st to sit at eve,
Musing o'er thy darling's grave.
O queen of numbers, once again,
Animate some chosen swain,
Who, fill'd with unexhausted fire,
May boldly smite the sounding lyre,
Who with some new, unequal'd song,
May rise above the rhyming throng;
O'er all our list'ning passions reign,
O'erwhelm our souls with joy and pain;
With terror shake, with pity move,
Rouse with revenge, or melt with love.
O deign t'attend his evening walk,
With him in groves and grottoes talk;
Teach him to scorn, with frigid art,
Feebly to touch th' enraptur'd heart;
Like light'ning, let his mighty verse
The bosom's inmost foldings pierce;
With native beauties win applause,
Beyond cold critics studied laws:
O let each muse's fame increase,
O bid Britannia rival Greece!

The following ode, written by Mr. Smart on the 5th of December, (being the birth-day of a beautiful young lady), is much to be admired for the variety and harmony of the numbers, as well as for the beauty of the thoughts, and the elegance and delicacy of the compliment. It has great fire, and yet great

Hail, eldest of the monthly train,
Sire of the winter dear,
December! in whose iron reign
Expires the chequer'd year.
Hush all the blust'ring blasts that blow,
And proudly plumb'd in silver snow,
Smile gladly on this blest of days;
The livery'd clouds shall on thee wait,
And Phœbus shine in all his state
With more than summer rays.
Tho' jocund June may jolly boast
Long days and happy hours;
Tho' August be Pomona's host,
And May be crown'd with flow'rs:
Tell June, his fire and crimson dies,
By Harriot's blush, and Harriot's eyes,
Eclips'd and vanquish'd, fade away;
Tell August, thou canst let him see
A richer, riper fruit than he,
A sweeter flow'r than May.

The ensuing ode, written by Mr. Collins on the death of Mr. Thompson, is of the pastoral and elegiac kind, and both picturesque and pathetic. To perceive all the beauties of this little piece, which are indeed many, we must suppose them to have been deliver'd on the river Thames near Richmond.

In yonder grave a Druid lies,
Where slowly winds the stealing wave;
The year's best sweets shall duteous rise
To deck its poet's sylvan grave!
In yon deep bed of whispering reeds
His airy harp * shall now be laid,
That he, whose heart in sorrow bleeds,
May love thro' life the soothing shade.
Then maids and youths shall linger here,
And, while its sounds at distance swell,
Shall sadly seem in pity's ear
To hear the woodland pilgrim's knell.
Remembrance oft shall haunt the shore,
When Thames in summer wreaths is dress'd,
And oft suspend the dashing oar,
To bid his gentle spirit rest!
And oft as ease and health retire
To breezy lawn, or forest deep,
The friend shall view yon whitening spire †,
And 'mid the varied landscape weep.
But thou, who own'st that earthy bed,
Ah! what will ev'ry dirge avail?
Or tears, which love and pity shed,
That mourn beneath the sliding sail?
Yet lives there one, whose heedless eye,
Shall scorn thy pale shrine glimmering near?
With him, sweet bard, may fancy die,
And joy desert the blooming year.
But thou, lorn stream, whose fullen tide
No sedge-crown'd sisters now attend,
Now waft me from the green hill's side,
Whose cold turf hides the buried friend.
And see, the fairy valleys fade,
Dim night has veil'd the solemn view!
Ye: once again, dear parted shade,
Meek nature's child, again adieu!

* The harp
of Æolus.

† Rich-
mond-
church.

The genial meads, assign'd to blest
Thy life, shall mourn thy early doom;
Their hinds, and shepherd girls, shall dress,
With simple hands thy rural tomb.
Long, long, thy stone and pointed clay
Shall melt the musing Briton's eyes;
O vales and wild woods, shall he say,
In yonder grave your Druid lies!

57. Under this species of the ode, notice ought to be taken of those written on divine subjects, and which are usually called *hymns*. Of these we have many in our language, but none perhaps that are so much admired as Mr Addison's. The beauties of the following hymn are too well known, and too obvious, to need any commendation; we shall only observe, therefore, that in this hymn (intended to display the power of the Almighty) he seems to have had a psalm of David in his view, which says, that "the heavens declare the glory of God, and the firmament sheweth his handy-work."

The spacious firmament on high,
With all the blue etherial sky,
And spangled heav'ns, a shining frame,
Their great original proclaim:
Th' unwearied sun, from day to day,
Does his Creator's pow'r display,
And publishes to ev'ry land
The work of an Almighty hand.

Soon as the ev'ning shades prevail,
The moon takes up the wond'rous tale,
And nightly to the list'n'g earth
Repeats the story of her birth:
While all the stars that round her burn,
And all the planets in their turn,
Confirm the tidings as they roll,
And spread the truth from pole to pole.

What tho' in solemn silence all
Move round the dark terrestrial ball?
What tho' no real voice or sound
Amid their radiant orb be found?
In reason's ear they all rejoice,
And utter forth a glorious voice,
For ever singing, as they shine,
"The hand that made us is divine."

The following pastoral hymn is a version of the 23d *Psalm* by Mr Addison; the peculiar beauties of which have occasioned many translations; but we have seen none that is so poetical and perfect as this. And in justice to Dr Boyce, we must observe, that the music he has adapted to it is so sweet and expressive, that we know not which is to be most admired, the poet or the musician.

The Lord my pasture shall prepare,
And feed me with a shepherd's care;
His presence shall my wants supply,
And guard me with a watchful eye;
My noon-day walks he shall attend,
And all my midnight hours defend.
When in the sultry glebe I faint,
Or on the thirsty mountain pant,
To fertile vales and dewy meads,
My weary wand'ring steps he leads;
Where peaceful rivers soft and slow,

Amid the verdant landscape flow.
Tho' in the paths of death I tread,
With gloomy horrors overspread,
My steadfast heart shall fear no ill:
For thou, O Lord, art with me still;
Thy friendly crook shall give me aid,
And guide me through the dreadful shade.
Tho' in a bare and rugged way,
Through desous lonely wilds I stray,
Thy bounty shall my pains beguile:
The barren wilderness shall smile,
With sudden greens and herbage crown'd;
And streams shall murmur all around.

58. III. We are now to speak of those odes which are of the sublime and noble kind, and distinguished from others by their elevation of thought and diction, as well as by the variety or irregularity of their numbers, as the frequent transitions and bold excursions with which they are enriched.

To give the young student an idea of the sudden and frequent transitions, digressions, and excursions, which are admitted into the odes of the ancients, we cannot do better than refer him to the celebrated song, or ode, of Moses; which is the oldest that we know of, and was penned by that divine author immediately after the children of Israel crossed the Red-Sea.

At the end of this song, we are told, that "Miriam the prophetess, the sister of Aaron, took a timbrel in her hand, and all the women went out after her with timbrels and with dances. And Miriam answered them, Sing ye to the Lord, for he hath triumphed gloriously; the horse and his rider hath he thrown into the sea."

From this last passage it is plain, that the ancients, very early, called in music to the aid of poetry; and that their odes were usually sung, and accompanied with their lutes, harps, lyres, timbrels, and other instruments: nay, so essential, and in such reputation, was music held by the ancients, that we often find in their lyric poets, addresses or invocations to the harp, the lute, or the lyre; and it was probably owing to the frequent use made of the last-mentioned instrument with the ode, that this species of writing obtained the name of *Lyric poetry*.

This ode, or hymn, which some believe was composed by Moses in Hebrew verse, is incomparably better than any thing the heathen poets have produced of the kind, and is by all good judges considered as a master-piece of ancient eloquence. The thoughts are noble and sublime: the style is magnificent and expressive: the figures are bold and animated: the transitions and excursions are sudden and frequent; but they are short, and the poet, having digressed for a moment, returns immediately to the great object that excited his wonder, and elevated his soul with joy and gratitude. The images fill the mind with their greatness, and strike the imagination in a manner not to be expressed. It has not indeed the measure, cadence, and harmony, which we meet with in some of the Greek and Latin poets; but these, perhaps, may, in some measure, have been lost in the translation.

59. We come now to the *Pindaric ode*, which is (if we except the hymns in the Old Testament, and the Psalms of king David) the most exalted part of Lyric poetry;

poetry; and was so called from Pindar, an ancient Greek poet, who is celebrated for the boldness of his flights, the impetuosity of his style, and the seeming wildness and irregularity that runs through his compositions, and which are said to be the effect of the greatest art. (See PINDAR.)

The odes of Pindar were held in such high estimation by the ancients, that it was fabled, in honour of their sweetness, that the bees, while he was in the cradle, brought honey to his lips: nor did the victors at the Olympic and other games think the crown a sufficient reward for their merit, unless their achievements were celebrated in Pindar's songs; most wisely prefiging, that the first would decay, but the other endure for ever.

This poet did not always write his odes in the same measure, or with the same intention with regard to their being sung. For the ode inscribed to *Diagoras*, (the concluding stanza of which we inserted at the beginning of this section) is in heroic measure, and all the stanzas are equal: there are others also, as Mr *West* observes, made up of *strophes* and *antistrophes*, without any *epode*; and some composed of *strophes* only, of different lengths and measures: but the greatest part of his odes are divided into *strophe*, *antistrophe*, and *epode*; in order, as Mr *Congreve* conjectures, to their being sung, and addressed by the performers to different parts of the audience. "They were sung, says he, by a chorus, and adapted to the lyre, and sometimes to the lyre and pipe. They consisted oftentimes of three stanzas. The first was called the *strophe*, from the version or circular motion of the fingers in that stanza from the right hand to the left. The second stanza was called the *antistrophe*, from the contraversion of the chorus; the fingers in performing that, turning from the left hand to the right, contrary always to their motion in the *strophe*. The third stanza was called the *epode*, (it may be as being the after-song), which they sung in the middle, neither turning to one hand nor the other." But Dr *West*'s * friend is of opinion, that the performers also danced one way while they were singing the *strophe*, and danced back as they sung the *antistrophe*, till they came to the same place again, and then standing still they sung the *epode*. He has translated a passage from the *Scholia* on *Hephestion*, in proof of his opinion; and observes, that the dancing the *strophe* and *antistrophe* in the same space of ground, and we may suppose the same space of time also, shows why those two parts consisted of the same length and measure.

As the various measures of Pindar's odes have been the means of so far misleading some of our modern poets, as to induce them to call compositions *Pindaric* odes, that were not written in the method of Pindar, it is necessary to be a little more particular on this head, and to give an example from that poet, the more effectually to explain his manner; which we shall take from the translation of Dr *West*.

The eleventh NEMEAN ODE.

This ode is inscribed to *Ariflagoras*, upon occasion of his entering on his office of president or governor of the island of *Tenedos*; so that, although it is placed among the *Nemean* odes, it has no sort of relation to those games, and is indeed properly an inauguration ode, composed to be sung by a chorus at

the sacrifices and the feasts made by *Ariflagoras* and his colleagues, in the town-hall, at the time of their being invested with the magistracy, as is evident from many expressions in the first *strophe* and *antistrophe*.

ARGUMENT.

Pindar opens this ode with an invocation to *Vesta* (the goddess who presided over the courts of justice, and whose statue and altar were for that reason placed in the town-halls, or *Prytaneums*, as the Greeks called them), beseeching her to receive favourably *Ariflagoras* and his colleagues, who were then coming to offer sacrifices to her, upon their entering on their office of *Prytans* or magistrates of *Tenedos*; which office continuing for a-year, he begs the goddess to take *Ariflagoras* under her protection during that time, and to conduct him to the end of it without trouble or disgrace. From *Ariflagoras*, Pindar turns himself in the next place to his father *Arcefilas*, whom he pronounces happy, as well upon account of his son's merit and honour, as upon his own great endowments and good fortune; such as beauty, strength, courage, riches, and glory resulting from his many victories in the games. But lest he should be too much puffed up with these praises, he reminds him at the same time of his mortality, and tells him that his clothing of flesh is perishable, that he must e'er long be clothed with earth, the end of all things: and yet, continues he, it is but justice to praise and celebrate the worthy and deserving, who from good citizens ought to receive all kinds of honour and commendation; as *Ariflagoras*, for instance, who hath rendered both himself and his country illustrious by the many victories he hath obtained, to the number of sixteen, over the neighbouring youth, in the games exhibited in and about his own country. From whence, says the poet, I conclude he would have come off victorious even in the *Pythian* and *Olympic* games, had he not been restrained from engaging in those famous lists by the too timid and cautious love of his parents. Upon which he falls into a moral reflection upon the vanity of man's hopes and fears; by the former of which they are oftentimes excited to attempts beyond their strength, which accordingly issue in their disgrace; as, on the other hand, they are frequently restrained, by unreasonable and ill-grounded fears, from enterprizes, in which they would in all probability have come off with honour. This reflection he applies to *Ariflagoras*, by saying it was very easy to foresee what success he was like to meet with, who both by father and mother was descended from a long train of great and valiant men. But here again, with a very artful turn of flattery to his father *Arcefilas*, whom he had before represented as strong and valiant, and famous for his victories in the games, he observes that every generation, even of a great and glorious family, is not equally illustrious, any more than the fields and trees are every year equally fruitful; that the gods had not given mortals any certain tokens, by which they might foreknow when the rich years of virtue should succeed; whence it comes to pass, that men out of self-conceit and presumption, are perpetually laying schemes, and forming enterprizes, without previously consulting prudence or wisdom, whose stream, says he, lie remote and out of the common road. From all which he infers, that it is

Of Lyric
Poetry.

better to moderate our desires, and set bounds to our
avarice and ambition; with which moral precept he
concludes the ode.

Great and illustrious home had he return'd;
While, by his fame eclips'd, his vanquish'd foes had
[mourn'd.

Of Lyric
Poetry.

STROPHE I.

Daughter of Rhea! thou, whose holy fire
Before the awful feat of justice flames!
Sister of heav'n's almighty fire!
Sister of Juno, who co-equal claims
With Jove to share the empire of the Gods!
O virgin Vesta! to thy dread abodes,
Lo! Aristagoras directs his pace!
Receive and near thy sacred sceptre place
Him, and his colleagues, who, with honest zeal,
O'er Tenedos preside, and guard the public weal.

ANTISTROPHE I.

And lo! with frequent off'rings, they adore
Thee *, first invok'd in ev'ry solemn pray'r!
To thee unmix'd libations pour,
And fill with od'rous fumes the fragrant air.
Around in festive songs the hymning choir
Mix the melodious voice and sounding lyre,
While still, prolong'd with hospitable love,
Are solemniz'd the rites of genial Jove:
Then guard him, Vesta, through his long career,
And let him close in joy his ministerial year.

EPODE I.

But hail, Arcefilas! all hail
To thee, blest father of a son so great!
Thou whom on fortune's highest scale
The favourable hand of heav'n hath set,
Thy manly form with beauty hath refin'd,
And match'd that beauty with a valiant mind.
Yet let not man too much presume,
Tho' grac'd with beauty's fairest bloom;
Tho' for superior strength renown'd;
Tho' with triumphal chaplets crown'd:
Let him remember, that, in flesh array'd,
Soon shall he see that mortal vestment fade;
Till lost, imprison'd in the mould'ring urn,
To earth, the end of all things, he return.

STROPHE II.

Yet should the worthy from the public tongue
Receive their recompence of virtuous praise;
By ev'ry zealous patriot sung,
And deck'd with ev'ry flow'r of heav'nly lays.
Such retribution in return for fame,
Such, Aristagoras, thy virtues claim,
Claim from thy country; on whose glorious brows
The wrestler's chaplet still unfaded blows;
Mix'd with the great Pancratiastic crown,
Which from the neighb'ring youth thy early valour won.

ANTISTROPHE II.

And (but his timid parents' cautious love,
Disturbing ever his too forward hand,
Forbad their tender son to prove
The toils of Pythia[†] or Olympia's sands),
Now by the Gods I swear, his valorous might
Had 'scap'd victorious in each bloody fight;
And from * Castalia, or where dark with shade
The mount † of Saturn rears its olive head,

EPODE II.

Then, his triumphal tresses bound
With the dark verdure of th' Olympic grove,
With joyous banquets had he crown'd
The great quinquennial festival of Jove;
And cheer'd the solemn pomp with choral lays,
Sweet tribute, which the muse to virtue pays.
But, such is man's prepost'rous fate!
Now, with o'er-weening pride elate,
Too far he aims his shaft to throw,
And straining bursts his feeble bow:
Now pusillanimous depress'd with fear,
He checks his virtue in the mid-career;
And of his strength distrustful, coward flies
The contest, tho' empow'r'd to gain the prize.

STROPHE III.

But who could err in prophesying good
Of him, whose undegenerating breath
Swells with a tide of Spartan blood,
From fire to fire in long succession trac'd
Up to Pisander; who in days of yore
From old Amyclæ to the Lesbian shore
And Tenedos, collegu'd in high command
With great Orestes, led th' Æolian band?
Nor was his mother's race less strong and brave,
Sprung from a stock that grew on fair † Ismenus' wave.

ANTISTROPHE III.

Tho' for long intervals obscur'd, again
 Oft-times the seeds of lineal worth appear.
For neither can the furrow'd plain
Full harvests yield with each returning year;
Nor in each period will the pregnant bloom
Invest the smiling tree with rich perfume.
So, barren often and inglorious pass
The generations of a noble race;
While nature's vigour, working at the root,
In after-ages swells, and blossoms into fruit.

EPODE III.

Nor hath Jove giv'n us to foreknow
When the rich years of virtue shall succeed:
Yet bold and daring on we go,
Contriving schemes of many a mighty deed;
While hope, fond inmate of the human mind,
And self-opinion, active, rash, and blind,
Hold up a false illusive ray,
That leads our dazzled feet astray
Far from the springs, where, calm and slow,
The secret streams of wisdom flow.
Hence should we learn our ardour to restrain:
And limit to due bounds the thirst of gain.
To rage and madnels oft that passion turns,
Which with forbidden flames despairing burns.

60. From the above specimen, and from what we
have already said on this subject, the reader will per-
ceive, that odes of this sort are distinguished by the
happy transitions and digressions which they admit,
and the surprizing yet natural returns to the subject.
This requires great judgment and genius; and the
poet

* It was
usual in all
solemn func-
tions and
prayers to
begin with
invoking
Vesta.

† Ismenus
was a river
of Boeotia,
of which
country was
the ancestor of
Aristagoras
by the
mother's
side.

* A river,
upon whose
banks the

Pythian
games were
exhibited.

† A small
hill planted
with olives,
that over-
looked the
Stadium at
Olympia.

poet who would excel in this kind of writing, should draw the plan of his poem, in manner of the argument we have above infer'd, and mark out the places where those elegant and beautiful fallies and wanderings may be made, and where the returns will be easy and proper.

Pindar, it is universally allow'd, had a poetical and fertile imagination, a warm and enthusiastic genius, a bold and figurative expression, and a concise and sententious style: but it is generally suppos'd that many of those pieces which procur'd him such extravagant praises and extraordinary testimonies of esteem from the ancients, are lost; and if they were not, it would be perhaps impossible to convey them into our language; for beauties of this kind, like plants of an odoriferous and delicate nature, are not to be transplanted into another clime without losing much of their fragrance, or essential quality.

61. With regard to those compositions which are usually call'd *Pindaric odes*, (but which ought rather to be distinguished by the name of *irregular odes*), we have many in our language that deserve particular commendation: and the criticism Mr Congreve has given us on that subject, has too much asperity, and too great latitude; for if other writers have, by mistaking Pindar's measures, given their odes an improper title, it is a crime, one would think, not so dangerous to the commonwealth of letters, as to deserve such severe reproof. Beside which, we may suppose that some of these writers did not deviate from Pindar's method through ignorance, but by choice; and that as their odes were not to be performed with both singing and dancing, in the manner of Pindar's, it seem'd unnecessary to confine the first and second stanzas to the same exact numbers as was done in his strophes and antistrophes. The poet therefore had a right to indulge himself with more liberty; and we cannot help thinking, that the ode which Mr Dryden has given us, intitled, *Alexander's Feast, or the Power of Music*, is altogether as valuable in his loose and wild numbers, as it could have been if the stanzas were more regular, and written in the manner of Pindar. In this ode there is a wonderful sublimity of thought, a loftiness and sweetness of expression, and a most pleasing variety of numbers.

'Twas at the royal feast, for Persia won

By Philip's warlike son,

Aloft, in awful state,

The god-like hero sat

On his imperial throne:

His valiant peers were plac'd around;

Their brows with roses and with myrtles bound,

(So should desert in arms be crown'd:)

'Tis lovely Thais by his side

Sat like a blooming eastern bride,

In flow'r of youth and beauty's pride.

Happy, happy, happy pair!

None but the brave,

None but the brave,

None but the brave,

None but the brave deserve the fair.

Chor. *Happy, happy, &c.*

Timotheus, plac'd on high

Amid the tuneful quire,

With flying fingers touch'd the lyre:
The trembling notes ascend the sky,

And heav'nly joys inspire.

The song began from Jove,

Who left his blissful seats above,

(Such is the pow'r of mighty love!)

A dragon's fiery form bely'd the God:

Sublime on radiant spheres he rode,

When he to fair Olympia press'd;

And while he fought her snowy breast:

Then round her slender waist he curl'd,

And stamp'd an image of himself, a sov'reign of the world.

The list'ning crowd admire the lofty sound.

A present deity, they shout around;

A present deity, the vaulted roofs rebound:

With ravish'd ears

The monarch hears,

Assumes the God,

Affects to nod,

And seems to shake the spheres.

Chor. *With ravish'd ears, &c.*

The praise of Bacchus then the sweet musician sung;

Of Bacchus ever fair and ever young:

The jolly God in triumph comes;

Sound the trumpets, beat the drums:

Flush'd with a purple grace,

He shows his honest face:

Now give the hautboys breath; he comes, he comes!

Bacchus, ever fair and young,

Drinking joys did first ordain:

Bacchus' blessings are a treasure,

Drinking is the soldier's pleasure:

Rich the treasure,

Sweet the pleasure:

Sweet is pleasure after pain.

Chor. *Bacchus' blessings, &c.*

Sooth'd with the sound, the king grew vain,

Fought all his battles o'er again;

And thrice he routed all his foes, and thrice he slew the slain.

The master saw the madness rise;

His glowing cheeks, his ardent eyes;

And while he heav'n and earth defy'd,

Chang'd his hand, and check'd his pride.

He chose a mournful muse

Soft pity to infuse:

He sung Darius great and good,

By too severe a fate,

Fallen, fallen, fallen, fallen,

Fallen from his high estate,

And wett'ring in his blood;

Deserted at his utmost need,

By those his former bounty fed,

On the bare earth expos'd he lies,

With not a friend to close his eyes.

With down-cast looks the joyless victor sat,

Revolving in his alter'd soul

The various turns of chance below;

And now and then a sigh he stole,

And tears began to flow.

Chor. *Revolving, &c.*

The mighty master smil'd, to see

That love was in the next degree:

'Twas but a kindred sound to move;

For pity melts the mind to love.

Softly sweet, in Lydian measures :

Soon he looth'd his soul to pleasures.

War, he sung, is toil and trouble ;

Honour but an empty bubble,

Never ending, still beginning,

Fighting still, and still destroying.

If the world be worth thy winning,

Think, O think, it worth enjoying.

Lovely Thais sits beside thee,

Take the good the gods provide thee.

The many round the skies with loud applause ;

So love was crown'd, but music won the cause.

The prince, unable to conceal his pain,

Gaz'd on the fair,

Who caus'd his care,

And sigh'd and look'd, sigh'd and look'd,

Sigh'd and look'd, and sigh'd again :

At length with love and wine at once oppress'd,

The vanquish'd victor sunk upon her breast.

Chor. The prince, &c.

Now strike the golden lyre again ;

A louder yet, and yet a louder strain.

Break his bands of sleep asunder,

And rouse him, like a rattling peal of thunder.

Hark ! hark ! the horrid sound

Has rais'd up his head,

As awak'd from the dead,

And amaz'd he stares round.

Revenge, revenge, Timotheus cries,

See the furies arise :

See the snakes that they rear,

How they hiss in their hair,

And the sparkles that flash from their eyes ;

Behold a ghastly band,

Each a torch in his hand !

Those are Grecian, that in battle were slain,

And unbury'd remain,

Inglorious on the plain.

Give the vengeance due

To the valiant crew.

Behold how they toss their torches on high,

How they point to the Persian abodes.

And glitt'ring temples of their hostile gods.

The princes applaud, with a furious joy ;

And the king seiz'd a flambeau, with zeal to destroy ;

Thais led the way

To light him to his prey,

And, like another Helen, fir'd another Troy.

Chor. And the king seiz'd, &c.

Thus long ago,

While organs yet were mute ;

Timotheus, to his breathing flute,

And sounding lyre,

Could swell the soul to rage, or kindle soft desire.

At last divine Cecilia came,

Inventress of the vocal frame ;

The sweet enthusiast, from her sacred store,

Enlarg'd the former narrow bounds,

And added length to solemn sounds,

With nature's mother-wit, and arts unknown before.

Let old Timotheus yield the prize,

Or both divide the crown ;

He rais'd a mortal to the skies ;

She drew an angel down.

Grand chor. At last, &c.

As Mr Pope has employ'd his masterly pen upon the same subject, it would be doing him a sort of injustice not to let him appear with Mr Dryden. Each of these odes, we may venture to say, is written with a spirit of poetry peculiar to the great genius of their respective authors ; but which of them has succeeded best, let the critics determine.

Descend, ye Nine ! descend and sing ;

The breathing instruments inspire,

Wake into voice each silent string,

And sweep the sounding lyre !

In a sadly-pleasing strain

Let the warbling lute complain :

Let the loud trumpet sound,

Till the roofs all around

The shrill echoes rebound :

While, in more lengthen'd notes and slow,

The deep, majestic, solemn organs blow.

Hark ! the numbers soft and clear

Gently steal upon the ear ;

Now louder, and yet louder rise,

And fill with spreading sounds the skies :

Exulting in triumph now swell the bold notes,

In broken air, trembling, the wild music floats ;

Till, by degrees, remote and small,

The strains decay,

And melt away

In a dying, dying fall.

By music minds an equal temper know,

Nor swell too high, nor sink too low.

If in the breast tumultuous joys arise,

Music her soft assuasive voice applies ;

Or when the soul is press'd with cares,

Exalts her in enlivening airs.

Warriors the fires with animated sounds,

Pours balm into the bleeding lover's wounds :

Melancholy lifts her head,

Morpheus rouses from his bed,

Sloth unfolds her arms and wakes,

Lift'ning Envy drops her snakes ;

Intestine war no more our passions wage,

And giddy factions hear away their rage.

But when our country's cause provokes to arms,

How martial music ev'ry bosom warms !

So when the first bold vessel dar'd the seas,

High on the stern the Thracian rais'd his strain,

While Argo saw her kindred trees

Descend from Pelion to the main.

Transported Demi-gods stood round,

And men grew heroes at the sound,

Enflam'd with glory's charms :

Each chief his sevenfold shield display'd,

And half unsheath'd the shining blade ;

And seas, and rocks, and skies rebound,

To arms, to arms, to arms !

But when through all th' infernal bounds

Which flaming Phlegeton furrounds,

Love, strong as death the poet led

To the pale nations of the dead,

What sounds were heard,

What scenes appear'd

O'er all the dreary coasts !

Dreadful gleams,

Dismal screams,

Fires that glow,

Shrieks

Shrieks of wo,
 Sullen moans,
 Hollow groans,
 And cries of tortur'd ghosts!
 But hark ! he strikes the golden lyre,
 And see, the tortur'd ghosts respire !
 See shady forms advance !
 Thy stone, O Sisyphus, stands still,
 Ixion rests upon his wheel,
 And the pale spectres dance !
 The Furies sink upon their iron beds,
 And snakes uncurl'd hang lightning round their heads.
 By the streams that ever flow,
 By the fragrant winds that blow
 O'er the Elysian bow'rs ;
 By those happy souls who dwell
 In yellow meads of asphodel,
 Or amaranthine bow'rs ;
 By the heroes armed shades,
 Glitt'ring thro' the gloomy glades ;
 By the youths who died for love,
 Wand'ring in the myrtle grove ;
 Restore, restore, Euridyce to life !
 Oh take the husband, or return the wife !
 He sung, and hell consented
 To hear the poet's pray'r ;
 Stern Proserpine relented,
 And gave him back the fair.
 Thus song could prevail
 O'er death and o'er hell,
 A conquest how hard and how glorious !
 Tho' fate had fast bound her
 With Styx nine times round her,
 Yet music and love were victorious.
 But soon, too soon, the lover turns his eyes :
 Again the falls, again she dies !
 How wilt thou now the fatal sisters move ?
 No crime was thine, if 'tis no crime to love,
 Now under hanging mountains,
 Beside the fall of fountains,
 Or where Hebrus wanders,
 Rolling in mæanders,
 All alone
 Unheard, unknown,
 He makes his moan ;
 And calls her ghost,
 For ever, ever, ever lost !
 Now with furies surrounded,
 Despairing, confounded,
 He trembles, he glows
 Amidst Rhodope's fnows :
 See, wild as the winds, o'er the desert he flies !
 Hark ! Hæmus resounds with the Bacchanals cries
 — Ah see, he dies !
 Yet even in death Euridyce he sung,
 Euridyce still trembled on his tongue ;
 Euridyce the woods,
 Euridyce the floods,
 Euridyce the rocks and hollow mountains rung.
 Music the fiercest grief can charm,
 And fate's severest rage disarm :
 Music can soften pain to ease,
 And make despair and madness please :
 Our joys below it can improve,
 And antedate the bliss above.

This the divine CECILIA found,
 And to her Maker's praise confin'd the found.
 When the full organ joins the tuneful quire,
 Th' immortal pow'rs incline their ear ;
 Borne on the swelling notes our souls aspire,
 While solemn airs improve the sacred fire,
 And angels lean from heav'n to hear.
 Of Orpheus now no more let poets tell,
 To bright Cecilia greater pow'r is giv'n :
 His numbers rais'd a shade from hell,
 Her's lift the soul to heav'n.

The following imitation of the 9th ode of the first
 book of Horace, by Mr Congreve, is of the irregular
 kind ; and has been much admir'd, as well for the
 beautiful description of the winter, as for his moral re-
 flections.

Bless me, 'tis cold ! how chill the air !
 How naked does the world appear !
 But see (big with the offspring of the north)
 The teeming clouds bring forth :
 A show'r of soft and fleecy rain
 Falls to new-clothe the earth again.
 Behold the mountain-tops, around,
 As if with fur of ermins crown'd :
 And lo ! how by degrees
 The universal mantle hides the trees
 In hoary flakes, which downward fly,
 As if it were the autumn of the sky ;
 Trembling the groves sustain the weight, and bow
 Like aged Limbs, which feebly go
 Beneath a venerable head of snow.
 Diffusive cold does the whole earth invade ;
 Like a disease, thro' all its veins 'tis spread,
 And each late living stream is numb'd and dead.
 Let's melt the frozen hours, make warm the air ;
 Let cheerful fires Sol's feeble beams repair :
 Fill the large bowl with sparkling wine ;
 Let's drink, 'till our own faces shine,
 'Till we like suns appear,
 To light and warm the hemisphere.
 Wine can dispense to all both light and heat,
 They are with wine incorporate :
 That pow'rful juice, with which no cold dares mix,
 Which still is fluid, and no frost can fix ;
 Let that but in abundance flow,
 And let it storm and thunder, hail and snow,
 'Tis heav'n's concern ; and let it be
 The care of heaven still, for me.
 Those winds, which rend the oaks and plough the sea,
 Great Jove can, if he please,
 With one commanding nod appease.
 Seek not to know to-morrow's doom ;
 That is not ours, which is to come.
 The present moment's all our store ;
 The next should heav'n allow,
 Then this will be no more :
 So all our Life is but one instant now.
 Look on each day you've past
 To be a mighty treasure won :
 And lay each moment out in haste ;
 We're sure to live too fast,
 And cannot live too soon.
 Youth does a thousand pleasures bring
 Which from decrepid age will fly ;

The

The flowers that flourish in the spring,
In winter's cold embraces die.
Now Love, that everlasting *Boy*, invites
To revel, while you may, in soft delights.
Now the kind nymph yields all her charms,
Nor yields in vain to youthful arms:
Slowly she promises at night to meet;
But eagerly prevents the hour with swifter feet;
To gloomy groves and shades obscure she flies,
There veils the bright confession of her eyes.

Unwilling she stays,
Would more unwillingly depart,
And in soft sighs conveys
The whispers of her heart.
Still she invites, and still denies,
And vows she'll leave you if y'are rude;
Then from her ravisher she flies,
But flies to be pursu'd:
If from his sight she does herself convey,
With a feign'd laugh she will herself betray,
And cunningly intrust him in the way.

Mr Mason's ode on *Constancy*, which is also of the irregular kind, shows that these sort of odes are well adapted to subjects of an elevated and sublime nature, where much imagery is introduced.

Whence does this sudden lustre rise,
That gilds the grove? Not like the noon-tide beam
Which sparkling daunces on the trembling stream,
Nor the blue lightning's flash swift-shooting thro' the
But such a solemn steady light, [skies;

As o'er the cloudless azure steals,
When *CYNTHIA*, riding on the brow of night,
Stops in their mid career her silver wheels.

Whence can it rise, but from the sober pow'r
Of *CONSTANCY*? the, heaven-born queen,
Descends, and in this (A) woobine-vested bower

Fixes her steadfast reign:
Stedfast as when her high command
Gives to the starry band
Their radiant stations in heav'n's ample plain:
Stedfast, as when around this nether sphere
She winds the purple year:

Tells what time the snow-drop cold
Its maiden whiteness may unfold,
When the golden harvest bend;

Then bids pale Winter wake to pour
The pearly hail's translucent show'r,
When the ruddy fruits descend,
To cast his silv'ry mantle o'er the woods,
And bind in crystal chains the slumb'ring floods:
The soul, which she inspires, has pow'r to climb
To all the heights sublime
Of virtue's tow'ring hill.

That hill, at whose low foot weak warbling strays
The scanty stream of human praise,
A shallow trickling rill.

While on the summits hov'ring angels shed
From their blest pinions the nectareous dew
Of rich immortal fame: from these the muse

Oft steals some precious drops, and blends with art
With those the lower streams impart;
Then show'r's it all on some high-favour'd head.
But thou, *ELFRIDA*, claim'st the genuine dew;
Thy worth demands it all,
Pure and unmixt on thee the sacred drops shall fall.

We shall conclude this section, and these examples, with Dr Akenfide's ode on the subject we have been treating of. In this piece, which is an original of the kind, the measures are varied in imitation of those ancients who have excelled in *lyric poetry*.

Once more I join the Thespian quire,
And taste th' inspiring fount again,
O parent of the Grecian lyre,
Admit me to thy sacred strain—
And lo! with ease my step invades
The pathless vale and opening shades,
'Till now I spy her verdant feat;
And now at large I drink the fount,
While these her offspring, list'ning round,
By turns her melody repeat.

I see Anacreon smile and sing,
His silver tresses breathe perfume;
His cheek displays a second spring
Of roses, taught by wine to bloom.
Away, deceitful cares, away!

And let me listen to his lay,
While flow'ry dreams my soul employ;
While turtle-wing'd the laughing Hours,
Lead hand in hand the festal pow'rs,
Lead Youth and Love, and harmless Joy.
Broke from the fetters of his native land,

Devoting shame and vengeance to her lords,
With louder impulse, and a threat'ning hand,
The Lesbian (a) patriot smites the sounding
Ye wretches, ye perfidious train, (chords:

Ye curs of gods and free-born men,
Ye murderers of the laws,
Though now you glory in your lust,
Though now you tread the feeble neck in dust,
Yet time and righteous *Jove* will judge your dreadful
cause.

But lo, to Sappho's mournful airs
Descends the radiant queen of love;
She smiles, and asks what fonder cares
Her suppliant's plaintive measures move:
Why is my faithful maid distrust?

Who, Sappho, wounds thy tender breast?
Say, flies he?—soon he shall pursue:
Shuns he thy gifts?—he too shall give:
Slight's he thy sorrows?—he shall grieve,

And bend him to thy haughty vow.
But, O Melpomene, for whom
Awakes thy golden shell again?

What mortal breath shall e'er presume
To echo that unbounded strain?
Majestic in the frown of years,
Behold the man of Thebes appears:

For some there are, whose mighty frame

† *Pin. Luc.*

To

(A) In which Ethelwold and Elfrida had been just exchanging professions of their mutual fidelity.

(B) Alceus of Mitylene, the capital of Lesbos, who fled from his native city to escape the operation of those who had enslaved it, and wrote against them in his exile those noble invectives which are much applauded by the ancient critics.

The hand of Jove at birth endow'd
 With hopes that mock the gazing crowd;
 As eagles drink the noontide flame,
 While the dim raven beats his weary wings,
 And clamours far below,—Propitious muse,
 While I so late unlock thy hallow'd springs,
 And breathe whatever thy ancient airs infuse,
 To polish Albion's warlike car
 This long-lost melody to hear,
 Thy sweetest arts employ;
 As when the winds from shore to shore,
 Thro' Greece thy lyre's persuasive language bore,
 Till towns, and isles, and seas return'd the vocal joy.
 But oft amid the Græcian throng,
 The loose-rob'd forms of wild desire
 With lawless notes intun'd thy song,
 To shameful steps dissolv'd thy quire.
 O fair, O chaste, be still with me,
 From such profaner discord free:
 While I frequent thy tuneful shade,
 No frantic shouts of Thracian flames,
 No satyrs fierce with savage flames,
 Thy pleasing accents shall invade.
 Queen of the lyre, in thy retreat,
 The fairest flow'rs of Pindus glow;
 The vine aspires to crown thy seat,
 And myrtles round thy laurel grow.
 Thy strings attune their varied strain,
 To every pleasure, every pain,
 Which mortal tribes were born to prove;
 And strait our passions rise or fall,
 As, at the winds imperious call,
 The ocean swells, the billows move.
 When midnight listens o'er the slumbering earth,
 Let me, O muse, thy solemn whisp'ers hear:
 When morning sends her fragrant breezes forth,
 With airy murmurs touch my opening ear.
 And ever watchful at thy side,
 Let wisdom's awful suffrage guide
 The tenor of thy lay:
 To her of old by Jove was giv'n
 To judge the various deeds of earth and heav'n;
 'Twas thine by gentle arts to win us to her sway.
 Oft as from stricter hours resign'd,
 I quit the maze where science toils,
 Do thou refresh my yielding mind
 With all thy gay, delusive spoils.
 But, O indulgent, come not nigh
 The busy steps, the jealous eye,
 Of gainful Care and wealthy Age,
 Whose barren souls thy joys disdain,
 And hold as foes to reason's reign
 Whome'er thy lovely haunts engage.
 With me, when Mirth's consenting band,
 Around fair Friendship's genial board,
 Invite the heart-awakening hand,
 With me salute the Teian chord.
 Or if involv'd at foster hours,
 O seek with me the happy bow'rs
 That hear Dione's gentle tongue;
 To beauty link'd with virtue's train,
 To love devoid of jealous pain,
 There let the sapphic lute be strung.
 But when from envy, and from death, to claim
 A hero bleeding for his native land;

Or, when to nourish freedom's vestal flame,
 I hear my genius utter his command;
 Nor Theban voice, nor Lesbian lyre
 From thee, O muse, do I require,
 While my prophetic mind,
 Conscious of pow'rs the never knew,
 Astonish'd, grasps at things beyond her view,
 Nor by another's fate hath felt herself confin'd.

SECT. III. Of the Elegy.

62. THE *Elegy* is a *mournful and plaintive*, but yet sweet and engaging kind of poem. It was first invented to bewail the death of a friend; and afterwards used to express the complaints of lovers, or any other melancholy subject. In process of time, not only matters of grief, but joy, wishes, prayers, expostulations, reproaches, admonitions, and almost every other subject, were admitted into elegy; however, funeral lamentations and affairs of love seem most agreeable to its character.

The plaintive elegy, in mournful state,
 Dishevell'd weeps the stern decrees of fate:
 Now paints the lover's torments and delights;
 Now the nymph flatters, threatens, or invites.
 But he, who would these passions well express,
 Must more of love than poetry possess.
 I hate those lifeless writers whose forc'd fire
 In a cold style describes a hot desire;
 Who sigh by rule, and, raging in cold blood,
 Their sluggish muse spur to an am'rous mood.
 Their ecstasies insipidly they feign;
 And always pine, and fondly hug their chain;
 Adore their prison, and their sufferings bless;
 Make sense and reason quarrel as they please.
 'Twas not of old in this affected tone,
 That smooth Tibullus made his am'rous moan;
 Or tender Ovid, in melodious strains,
 Of love's dear art the pleasing rules explains.
 You, who in elegy would justly write,
 Consult your heart; let that alone decide.

[From the French of Despreux.] SOAMES.

The plan of an elegy, as indeed of all other poems, ought to be made before a line is written; or else the author will ramble in the dark, and his verses have no dependance on each other. No *epigrammatic points* or conceits, none of those *fine things* which most people are so fond of in every sort of poem, can be allowed in this, but must give place to nobler beauties, those of *nature* and the *passions*. Elegy rejects whatever is facetious, satirical, or majestic, and is content to be plain, decent, and unaffected; yet in this humble state is the sweet and engaging, elegant and attractive. This poem is adorned with frequent *commiserations*, *complaints*, *exclamations*, *addresses to things or persons*, short and proper *digressions*, *allusions*, *comparisons*, *proseopoeias* or feigned persons, and sometimes with short *descriptions*. The diction ought to be free from any harshness; neat, easy, perspicuous, expressive of the *manner*, tender, and pathetic; and the numbers should be smooth and flowing, and captivate the ear with their uniform sweetness and delicacy.

Of elegies on the subject of death, that by Mr Gray, written in a country church-yard, is one of the best that has appeared in our language, and may be justly esteemed

esteemed a masterpiece. But being so generally known, it would be superfluous to insert it here.
On the subject of love, we shall give an example from the elegies lately published by Mr Hammond.

Let others boast their heaps of shining gold,
And view their fields with waving plenty crown'd,
Whom neighb'ring foes in constant terror hold,
And trumpets break their slumbers, never sound:
While, calmly poor, I trifle life away,
Enjoy sweet leisure by my cheerful fire,
No wanton hope my quiet shall betray,
But cheaply blest I'll scorn each vain desire.
With timely care I'll sow my little master,
And plant my orchard with its father's hand;
Nor blush to spread the hay, the hook to wield,
Or orange the sheaves along the funny land.
If late at dusk, while carelessly I roam,
I meet a strolling kid or bleating lamb,
Under my arm I'll bring the wand'ring home,
And not a little chide its thoughtless dam.
What joy to hear the tempest howl in vain,
And clasp a fearful mistress to my breast?
Or lull'd to slumber by the beating rain,
Secure and happy sink at last to rest.
Or if the sun in flaming Leo ride,
By shady rivers indolently stray,
And, with my DELIA walking side by side,
Hear how they murmur, as they glide away.
What joy to wind along the cool retreat,
To stop and gaze on DELIA as I go!
To mingle sweet discourse with kisses sweet,
And teach my lovely scholar all I know!
Thus pleas'd at heart, and not with fancy's dream,
In silent happiness I rest unknown;
Content with what I am, not what I seem,
I live for DELIA and myself alone.
Ah foolish man! who, thus of her possess'd,
Could float and wander with ambition's wind,
And, if his outward trappings spoke him blest,
Not heed the sickness of his conscious mind.
With her I scorn the idle breath of praise,
Nor trust to happiness that's not our own;
The smile of fortune might suspicion raise,
But here I know that I am lov'd alone.
STANHOPE, in wisdom as in wit divine,
May rise and plead Britannia's glorious cause,
With steady reign his eager wit confine,
While manly sense the deep attention draws.
Let STANHOPE speak his list'ning country's wrong,
My humble voice shall please one partial maid;
For her alone I pen my tender song,
Securely sitting in his friendly shade.
STANHOPE shall come, and grace his rural friend;
DELIA shall wonder at her noble guest,
With blushing awe the ripper fruit commend,
And for her husband's patron cull the best.
Her's be the care of all my little train,
While I with tender indolence am blest,
The favourite subject of her gentle reign,
By love alone distinguish'd from the rest.
For her I'll yoke my oxen to the plough,
In gloomy forests tend my lonely flock,
For her a goat-herd climb the mountain's brow,
And sleep extended on the naked rock.
Ah! what avails to press the stately bed,

And far from her 'midst tasteless grandeur weep,
By warbling fountains lay the pensive head,
And, while they murmur, strive in vain to sleep!
DELIA alone can please and never tire,
Exceed the pangs of thought in true delight;
With her, enjoyment wakes new desire,
And equal rapture glows thro' every night.
Beauty and worth, alone in her, contend,
To charm the fancy, and to fix the mind;
In her, my wife, my mistress, and my friend,
I taste the joys of sense and reason join'd.
On her I'll gaze when others loves are o'er,
And dying press her with my clay-cold hand—
Thou weep'st already, as I were no more,
Nor can that gentle breast the thought withstand,
Oh! when I die, my latest moments spare,
Nor let thy grief with sharper torments kill:
Would not thy cheeks, nor hurt that flowing hair;
Tho' I am dead, my soul shall love thee still.
Oh quit the room, oh quit the deathful bed,
Or thou wilt die, so tender is thy heart!
Oh leave me, DELIA! ere thou see me dead,
These weeping friends will do thy mournful part.
Let them, extended on the decent bier,
Convey the corpse in melancholy state,
Tho' all the village spread the tender tear,
While pitying maids our wond'rous loves relate.

SECT. IV. Of the Pastoral.

63. This poem takes its name from the Latin word *pastor*, a "shepherd;" the subject of it being something in the pastoral or rural life; and the persons, or interlocutors, introduced in it, either shepherds or other rustics.

These poems are frequently called *eclogues*, which signifies "select or choice pieces;" though some account for this name in a different manner. They are also called *bucolicks*, from *ΒΟΥΚΑΛΩ*, a "herdman."

This kind of poem, when happily executed, gives great delight; nor is it a wonder, since innocence and simplicity generally please: to which let us add, that the scenes of pastorals are generally laid in the country, where both poet and painter have abundant matter for the exercise of genius, such as enchanting prospects, purling streams, shady groves, enamelled meads, flowery lawns, rural amusements, the bleating of flocks, and the music of birds; which is of all melody the most sweet and pleasing, and calls to our mind the wisdom and taste of Alexander, who, on being importuned to hear a man that imitated the notes of the nightingale, and was thought a great curiosity, replied, that he had had the happiness of hearing the nightingale herself.

The character of the pastoral consists in simplicity, brevity, and delicacy; the two first render an eclogue *natural*, and the last *delightful*. With respect to nature, indeed, we are to consider, that as a pastoral is an image of the ancient times of innocence and undesigning plainness, we are not to describe shepherds as they really are at this day, but as they may be conceived then to have been, when the best of men, and even princes, followed the employment. For this reason, an air of piety should run through the whole poem; which is visible in the writings of antiquity.

To make it natural with respect to the present age, some

Pastoral. some knowledge in rural affairs should be discovered, and that in such a manner as if it was done by chance rather than by design; left by too much pains to seem natural, that simplicity be destroyed from whence arises the delight; for what is so engaging in this kind of poetry proceeds not so much from the idea of a country life itself, as in exposing only the best part of a shepherd's life, and concealing the misfortunes and miseries which sometimes attend it. Besides, the subject must contain some particular beauty in itself, and each eclogue present a scene or prospect to our view enriched with variety: which variety is in a great measure obtained by frequent comparisons drawn from the most agreeable objects of the country; by interrogations to things inanimate; by short and beautiful digressions; and by elegant turns on the words, which render the numbers more sweet and pleasing. To this let us add, that the connections must be negligent, the narrations and descriptions short, and the periods concise.

Riddles, parables, proverbs, antique phrases, and superstitious fables, are fit materials to be intermixed with this kind of poem. They are here, when properly applied, very ornamental; and the more so, as they give our modern compositions the air of the ancient manner of writing.

The style of the pastoral ought to be humble, yet pure; neat, but not florid; easy, and yet lively: and the numbers should be smooth and flowing.

This poem in general should be short, and ought never much to exceed 100 lines; for we are to consider that the ancients made these sort of compositions their amusement, and not their business: but however short they are, every eclogue must contain a plot or fable, which must be simple and one; but yet so managed as to admit of short digressions. Virgil has always observed this.—We shall give the plot or argument of his first pastoral as an example. *Melibæus, an unfortunate shepherd, is introduced with Tityrus, one in more fortunate circumstances; the former addresses the complaint of his sufferings and banishment to the latter, who enjoys his flock and folds in the midst of the public calamity, and therefore expresses his gratitude to the benefactor from whom this favour flowed: but Melibæus accuses fortune, civil wars, and bids adieu to his native country. This is therefore a dialogue.*

But we are to observe, that the poet is not always obliged to make his eclogue *allegorical*, and to have real persons represented by the fictitious characters introduced; but is in this respect entirely at his own liberty.

Nor does the nature of the poem require it to be always carried on by way of dialogue; for a shepherd may with propriety sing the praises of his love, complain of her inconstancy, lament her absence, her death, &c. and address himself to groves, hills, rivers, and such like rural objects, even when alone.

We shall now give an example from each of those authors who have eminently distinguished themselves by this manner of writing, and introduce them in the order of time in which they were written.

64. Theocritus, who was the father or inventor of this kind of poetry, has been deservedly esteemed by the best critics; and by some, whose judgment we can-

not dispute, preferred to all other pastoral writers. We shall insert his third *idyllium*, not because it is the best, but because it is within our compass.

To Amaryllis, lovely nymph, I speed,
Mean while my goats upon the mountains feed:
O Tityrus, tend them with assiduous care,
Lead them to crystal fountains and pastures fair,
And of the ridgling's butting horns beware.
Sweet Amaryllis, have you then forgot,
Our secret pleasures in the conscious grott,
Where in my folding arms you lay reclin'd?
Blest was the shepherd, for the nymph was kind.
I whom you call'd *your Dear, your Love*, so late,
Say, am I now the object of your hate?
Say, is my form displeasing to your sight?
This cruel love will surely kill me quite.
Lo! ten large apples, tempting to the view,
Pluck'd from your favourite tree, where late they grew.
Accept this boon, 'tis all my present store;
To-morrow will produce as many more.
Mean while these heart-consuming pains remove,
And give me gentle pity for my love.
Oh ~~was~~ I made by some transforming power
A bee to buzz in your sequester'd bow'r!
To pierce your ivy shade with murmuring sound,
And the light leaves that compass you around,
I know thee, Love, and to my sorrow find,
A god thou art, but of the savage kind;
A lioness sure suckled the fell child,
And with his brothers nurs'd him in the wild;
On me his scorching flames incessant prey,
Glow in my bones, and melt my soul away.
Ah, nymph, whose eyes destructive glances dart,
Fair is your face, but flinty is your heart;
With kisses kind this rage of love appease;
For me, fond swain! ev'n empty kisses please.
Your scorn distracts me, and will make me tear
The flow'ry crown I wove for you to wear,
Where roses mingle with the ivy-wreath,
And fragrant herbs ambrosial odours breathe.
Ah me! what pangs I feel; and yet the fair
Nor sees my sorrows, nor will hear my pray'r.
I'll doff my garments, since I needs must die,
And from you rock, that points its summit high,
Where patient Alps snare the sinny fry,
I'll leap, and, though perchance I rise again,
You'll laugh to see me plunging in the main.
By a prophetic poppy-leaf I found
Your chang'd affection, for it gave no sound
Though in my hand itruck hollow as it lay,
But quickly wither'd like your love away.
An old witch brought sad tidings to my ears,
She who tells fortunes with the sieve and sheers;
For leasing barley in my fields of late,
She told me, I should love, and you should hate!
For you my care a milk-white goat supply'd,
Two wanton kids run frisking at her side;
Which oft the not brown maid, Erithacis,
Has begg'd, and paid before-hand with a kiss;
And since you thus my ardent passion slight,
Her's they shall be before to-morrow night.
My right eye itches; may it lucky prove,
Perhaps I soon shall see the nymph I love;

Beneath yon pine I'll sing distinct and clear,
Perhaps the fair my tender notes shall hear;
Perhaps may pity my melodious moan;
She is not metamorphos'd into stone.

Hippomenes, provok'd by noble strife,
To win a mistress, or to lose his life,
Threw golden fruit in Atalanta's way:

The bright temptation caus'd the nymph to slay;
She look'd, she languish'd, all her soul took fire,
She plung'd into the gulph of deep desire,

To Pyle from Othrys sage Melampus came,
He drove the loving herd, wet won the dame;
Fair Pero blest his brother Bias' arms,
And in a virtuous race diffus'd un fading charms.

Adonis fed his cattle on the plain,
And sea-born Venus lov'd the rural swain;
She mourn'd him wounded in the fatal chase,
Nor dead dismiss'd him from her warm embrace.

Though young Eadymion was by Cynthia blest,
I envy nothing but his lasting rest.

Jason slumb'ring on the Cretan plain
Ceres once saw, and blest the happy swain
With pleasures too divine for ears profane.

My head grows giddy, love affects me sore;
Yet you regard not; so I'll sing no more—
Here will I put a period to my care—
Adieu, false nymph, adieu, ungrateful fair:
Stretch'd near the grotto, when I've breath'd my last,
My corse will give the wolves a rich repast,
As sweet to them as honey to your taste.

FAWKES.

65. Virgil succeeds Theocritus, from whom he has
in some places copied, and always imitated with success.
As a specimen of his manner, we shall introduce his first
pastoral, which is generally allowed to be the most perfect.

MELIBOEUS AND TITYRUS.

Mel. Beneath the shade which beechen boughs diffuse,
You, Tityrus, entertain your sylvan muse.
Round the wide world in banishment we roam,
Forc'd from our pleasing fields and native home;
While stretch'd at ease you sing your happy loves,
And Amaryllis fills the shady groves.

Tit. These blessings, friend, a deity bestow'd;
For never can I deem him less than god.
The tender friskings of my woolly breed
Shall on his holy altar often bleed.
He gave me kine to graze the flow'ry plain,
And so my pipe renew'd the rural strain.

Mel. I envy not your fortune; but admire,
That while the raging sword and wasteful fire
Destroy the wretched neighbourhood around,
No hostile arms approach your happy ground.
Far different is my fate; my feeble goats
With pains I drive from their forsaken cotes:
And this you see I scarcely drag along,
Who yeaning on the rocks has left her young,
The hope and promise of my falling fold,
My loss by dire portents the gods foretold;
For, had I not been blind, I might have seen
Yon riven oak, the fairest on the green,
And the hoarse raven on the blasted bough
By croaking from the left presag'd the coming blow.

But tell me, Tityrus, what heavenly pow'r
Preserv'd your fortunes in that fatal hour?

Tit. Fool that I was, I thought imperial Rome
Like Mantua, where on market-days we come,
And thither drive our tender lambs from home.
So kids and whelps their fires and dams express;
And so the great I measur'd by the less:
But country-towns, compar'd with hers, appear
Like shrubs when lofty cypresses are near.

Mel. What great occasion call'd you hence to Rome?

Tit. Freedom, which came at length, tho' slow to come:
Nor did my search of liberty begin

Till my black hairs were chang'd upon my chin.
Nor Amaryllis would vouchsafe a look,

Till Galatea's meaner bonds I broke.
Till then a helpless, hopeless, homely swain,

I sought not freedom, nor aspir'd to gain:
Tho' many a victim from my folds was bought,

And many a cheefe to country markets brought,
Yet all the little that I got I spent,

And still remain'd as empty as I went.

Mel. We stood amaz'd to see your mistress mourn,
Unknowing that the pin'd for your return;

We wonder'd why she kept her fruit so long,
For whom so late th' ungather'd apples hung:

But now the wonder ceases, since I see
She kept them only, Tityrus, for thee:

For thee the bubbling springs appear'd to mourn,
And whisp'ring pines made vows for thy return.

Tit. What should I do? while here I was chain'd,
No glimpse of godlike liberty remain'd;

Nor could I hope in any place but there
To find a god so present to my pray'r.

There first the youth of heav'nly birth I view'd,
For whom our monthly victims are renew'd.

He heard my vows, and graciously decreed
My grounds to be restor'd, my former flocks to feed.

Mel. O fortunate old man! whose farm remains
For you sufficient, and requites your pains,

Though rushes overspread the neighb'ring plains,
Tho' here the marshy grounds approach your fields

And there the soil a stony harvest yields.
Your teeming ewes shall no strange meadows try,

Nor fear a rot from tainted company.
Behold yon bord'ring fence of fallow trees

[bees:]
Is fraught with flow'rs, the flow'rs are fraught with
The busy bees, with a soft murmur'ing strain,

Invite to gentle sleep the lab'ring swain:
While from the neighb'ring rock with rural songs

The pruner's voice the pleasing dream prolongs;
Stock-doves and turtles tell their am'rous pain,

And, from the lofty elms, of love complain.

Tit. Th' inhabitants of seas and skies shall change,
And fish on shore and flogs in air shall range,

The banish'd Parthian dwell on Arar's brink,
And the blue German shall the Tigris drink;

Ere I, forsaking gratitude and truth,
Forget the figure of that godlike youth.

Mel. But we must beg our bread in climes unknown,
Beneath the scorching or the freezing zone;

And some to fair Oaxis shall be fold,
Or try the Libyan heat, or Scythian cold;

The rest among the Britons be confin'd,
A race of men from all the world disjoin'd.

Pastoral. O! must the wretched exiles ever mourn?
 Nor after length of rolling years return?
 Are we condemn'd by fate's unjust decree,
 No more our houses and our homes to see?
 Or shall we mount again the rural throne,
 And rule the country, kingdoms once our own?
 Did we for these barbarians plant and sow,
 On these, on these, our happy fields bestow?
 Good heav'n, what dire effects from civil discord flow!
 Now let me graft my pears, and prune the vine;
 The fruit is theirs, the labour only mine.
 Farewel my pastures, my paternal flock,
 My fruitful fields, and my more fruitful stock!
 No more, my goats, shall I behold you climb
 The steepy cliffs, or crop the flow'ry thyme;
 No more extended in the grot below,
 Shall see you browsing on the mountain's brow
 The prickly shrubs, and after on the bare
 Lean down the deep abyss and hang in air!
 No more my sheep shall tip the morning dew;
 No more my fong shall please the rural crew:
 Adieu, my tuneful pipe! and all the world, adieu!

Ti. This night, at least, with me forget your care;
 Chefsuts and curds and cream shall be your fare:
 The carpet-ground shall be with leaves o'er-spread,
 And boughs shall weave a covering for your head:
 For see yon sunny hill the shade extends,
 And curling smoke from cottages ascends.

DRYDEN.

66. Spenser was the first of our countrymen, who acquired any considerable reputation by this method of writing. We shall insert his sixth eclogue, or that for June, which is allegorical, as will be seen by the

ARGUMENT. "Hobbinol, from a description of the pleasures of the place, excites Colin to the enjoyment of them. Colin declares himself incapable of delight, by reason of his ill success in love, and his loss of Rosalind, who had treacherously forsaken him for Menalcas, another shepherd. By Tityrus (mentioned before in Spenser's second eclogue, and again in the twelfth) is plainly meant Chaucer, whom the author sometimes professed to imitate. In the person of Colin, is represented the author himself; and Hobbinol's inviting him to leave the hill country, seems to allude to his leaving the North, where, as is mentioned in his life, he had for some time resided."

Hob. Lo! Colin, here the place, whose pleasant sight
 From other shades hath wean'd my wand'ring mind:

Tell me, what wants me here, to work delight?
 The simple air, the gentle warbling wind,
 So calm, so cool, as nowhere else I find:
 The grassy ground with dainty daisies dight,
 The bramble-bush, where birds of every kind
 To th' water's fall their tunes attempt right.

Col. O! happy Hobbinol, I bless thy state,
 That paradise hast found which Adam lost.

Here wander may thy flock early or late,
 Withouten dread of wolves to been yitolt;
 Thy lovely lays here may't thou freely boast?

But I, unhappy man! whom cruel fate,
 And angry Gods, pursue from coast to coast,
 Can nowhere find to throud my luckless pate.

Hob. Then if by me thou list advised be,

Forsake the soil that so doth thee bewitch:

Leave me those hills, where harbroughnis to see,
 Nor holly-bush, nor brere, nor winding ditch;
 And to the dales resort, where shepherds rich,
 And fruitful flocks been every where to see:

Here no night-ravens lodge, more black than pitch,
 Nor elvish ghouls, nor ghastly owls do flee.

But friendly fairies met with many graces,
 And light-foot nymphs can chase the ling'ring night,
 With heydegues, and trimly trodden traces;
 Whilst sisters nine, which dwell on Parnass' height,
 Do make them music, for their more delight;

And Pan himself to kiss their crystal faces,
 Will pipe and dance, when Phoebe shineth bright:
 Such peerless pleasures have we in these places.

Col. And I, whilst youth, and course of careless years,
 Did let me walk withouten links of love,

In such delights did joy amongst my peers:
 But riper age such pleasures doth reprove,

My fancy eke from former follies move
 To strayed steps: for time in passing wears
 (As garments doen, which waxen old above)
 And draweth new delights with hoary hairs.

Though couch I sing of love, and tune my pipe
 Unto my plaintive pleas in verses made:

Though would I seek for queen-apples unripe
 To give my Rosalind, and in summer shade

Dight gawdy girlonds was my common trade,
 To crown her golden locks: but years more ripe,
 And loss of her, whose love as life I wayde,
 Those weary wanton toys away did wipe.

Hob. Colin, to hear thy rhymes and roundelsays,
 Which thou wert wont on wat'ful hills to sing,

I more delight, than lark in summer days:
 Whole echo made the neighbour groves to ring,
 And taught the birds, which in the lower spring
 Did shroud in shady leaves from sunny rays,
 Frame to thy song their cheerful chattering,
 Or hold their peace, for shame of thy sweet lays.

I saw Calliope with muses mee,
 Soon as thy oaten pipe began to found,
 Their ivory lutes and tamburins forego,
 And from the fountain, where they sat around,
 Ren after hastily thy silver sound.

But when they came, where thou thy skill didst show,
 They drew aback, as half with shame confound,

Shepherd to see, them in their art out-go.

Col. Of muses, Hobbinol, I con no skill,
 For they been daughters of the highest Jove,

And holden scorn of homely shepherds quill:
 For sith I heard that Pan with Phoebe strove

Which him to much rebuke and danger drove,
 I never list presume to Parnass' hill,

But piping low, in shade of lowly grove,
 I wot my rimes been rough, and rudely drest;

Nought weigh I, who my song doth praise or blame;
 Ne strive to win renown, or pass the rest:

With shepherds fits not follow flying fame,
 But feed his flocks in fields, where falls him best.

I wot my rimes been rough, and rudely drest;
 The sifter they, my careful case to frame:

Enough is me to paint out my unrest,
 And pour my piteous complaints out in the same.

The God of shepherds, Tityrus, is dead,
 Who taught me homely, as I can, to make:

He, whilst he lived, was the sovereign head
Of shepherds all, that been with love ytake.
Well couth he wail his woes, and lightly flake
The flames which love within his heart had bred,
And tell us merry tales, to keep us wake,
The while our sheep about us safely fed.

Now dead he is, and lieth wrapt in lead,
(O why should death on him such outrage show!)
And all his passing skill with him is fled,
The fame whereof doth daily greater grow.

But if on me some little drops would flow
Of that the spring was in his learned hed,
I soon would learn these woods to wail my woe,
And teach the trees their trickling tears to shed.

Then should my plaints, caus'd of discourteese,
As messengers of this my painful flight,
Fly to my love, wherever that he be,
And pierce her heart with point of worthy wight;
As she deserves, that wrought so deadly sight.

And thou, Menalcas, that by treachery
Didst underfong my lads to wax so light,
Should'st it well be known for such thy villany.

But since I am not, as I wish I were,
Ye gentle shepherds, which your flocks do feed,
Whether on hills or dales, or other where,
Bear witness all of this so wicked deed:

And tell the lads, whose flower is woxe a weed,
And faultless faith is turn'd to faithless seere,
That she the truest shepherd's heart made bleed,
That lives on earth, and loved her most dear.

Hob. O! careful Colin, I lament thy case,
Thy tears would make the hardest flint to flow!
Ah! faithless Rosalind, and void of grace,
That art the root of all this rueful woe!

But now is time, I guess, homeward to go;
Then rest, ye blessed flocks, and home apace,
Lest night with stealing steps do you forefello,
And wet your tender lambs that by you trace.

67. By the following eclogue the reader will perceive that Mr Philips has, in imitation of Spencer, preserved in his pastorals many antiquated words, which, though they are discarded from polite conversation, may naturally be supposed still to have place among the shepherds and other rusticks in the country. We have made choice of his second eclogue, because it is brought home to his own business, and contains a complaint against those who had spoken ill of him and his writings.

THENOT, COLINET.

Th. Is it not Colinet I lonesome see
Leaning with folded arms against the tree?
Or is it age of late bedims my sight?
'Tis Colinet, indeed, in woful plight.
Thy cloudy look, why melting into tears,
Unfemly, now the sky so bright appears?
Why in this mournful manner art thou found,
Unthankful lad, when all things smile around?
Or hear'st not lark and linnet jointly sing,
Their notes blithe-warbling to salute the spring?

Co. Tho' blithe their notes, not so my wayfar'd feet;
Nor lark would sing, nor linnet, in my fate.
Each creature, Thenot, to his task is born;
As they to mirth and music, I to mourn.

Waking, at midnight, I my woes renew,
My tears oft mingling with the falling dew.

Th. Small cause, I ween, has lusty youth to plain;
Or who may then the weight of eld sustain,
When every slackening nerve begins to fail,
And the load presseth as our days prevail?
Yet, though with years my body downward tend,
As trees beneath their fruit in autumn bend,
Spite of my snowy head and icy veins,
My mind a cheerful temper still retains:
And why should many mishap what will, repine,
Sour every sweet, and mix with tears his wine?
But tell me then; it may relieve thy woe,
To let a friend thine inward ailment know.

Co. Idly 'twill waste thee, Thenot, the whole day,
Should'st thou give ear to all my grief can say.
Thine ewes will wander; and the heedless lambs,
In loud complaints, require their absent dams.

Th. See Lightfoot; he shall tend them close: and I,
'Tween whiles, a-crois the plain will glance mine eye.

Co. Where to begin I know not, where to end.
Does there one smiling hour my youth attend?
Though few my days, as well my follies show,
Yet are those days all clouded o'er with woe:
No happy gleam of sunshine doth appear,
My low'ring sky and wintry months to cheer.
My piteous plight in yonder naked tree,
Which bears the thunder-scar, too plain I see:
Quite delitute it stands of shelter kind,
The mark of storms, and sport of every wind:
The riven trunk feels not th' approach of spring;
Nor birds among the leafless branches sing:
No more, beneath thy shade, shall shepherds throng
With jocund tale, or pipe, or pleasing song.
Ill-fated tree! and more ill-fated I!
From thee, from me, alike the shepherds fly.

Th. Sure thou in hapless hour of time wast born,
When blighting mildews spoil the rising corn,
Or blasting winds o'er blossom'd hedge-rows pass,
To kill the promis'd fruits, and scorch the grass;
Or when the moon, by wizard charm'd, foreshows,
Blood-stain'd in foul eclipse, impending woes.
Untimely born, ill luck betides thee still.

Co. And can there, Thenot, be a greater ill?
Th. Nor fox, nor wolf, nor rot among our sheep:
From these good shepherd's care his flock may keep:
Against ill-luck, alas! all forecast fails;
Nor toil by day, nor watch by night, avails.

Co. Ah me, the while! ah me, the luckless day!
Ah luckless lad! besite me more to say.
Unhappy hour! when fresh in youthful bud,
I left, Sabrina fair, thy silv'ry flood.
Ah, silly I! more silly than my sheep,
Which on thy flow'ry banks I wont to keep.
Sweet are thy banks; oh, when shall I once more,
With ravish'd eyes review thine amell'd shore?
When, in the crystal of thy waters, scan
Each feature faded, and thy colour wan?
When shall I see my hut, the small abode
Myself did raise and cover o'er with sod?
Small though it be, a mean and humble cell,
Yet is there room for peace, and me, to dwell.

Th. And what enticement charm'd thee, far away,
From thy lov'd home, and led thy heart astray?

Co.

Pastoral.

Pastoral.

Co. A lewd desire strange lands, and swains, to know.

Ah me! that ever I should covet woe.

With wand'ring feet unblest, and fond of fame,

I fought I know not what besides a name.

Th. Or, sooth to say, didst thou not hither come

In search of gains more plenty than at home?

A rolling stone is, ever, bare of mofs;

And, to their cost, green years old proverbs cros.

Co. Small need there was, in random search of gain,

To drive my pining flock athwart the plain,

To distant Cam. Fine gain at length, I trow,

To hoard up to myself such deal of woe!

My sheep quite spent through travel and ill fare,

And like their keeper ragged grown and bare,

The damp cold green ward for my nightly bed,

And some flaunt willow's trunk to rest my head.

Hard is to bear of pinching cold the rain;

And hard is want to the unpractis'd swain;

But neither want, nor pinching cold, is hard,

To blasting storms of calumny compar'd:

Unkind as hail it falls; the pelting show'r

Destroys the tender herb and budding show'r.

Th. Slender we shepherds count the vilest wrong:

And what wounds surer than an evil tongue?

Co. Untoward lads, the wanton imps of spite,

Make mock of all the ditties I endite.

In vain, O Colinet, thy pipe, fo shrill,

Charms every vale, and gladdens every hill:

In vain thou seek'st the coverings of the grove,

In the cool shade to sing the pains of love:

Sing what thou wilt, ill-nature will prevail;

And every elf hath skill enough to rail.

But yet, though poor and artless be my vein,

Menalcas seems to like my simple strain:

And, while that he delighteth in my song,

Which to the good Menalcas doth belong,

Nor night, nor day, shall my rude music cease;

I ask no more, so I Menalcas please.

Th. Menalcas, lord of these fair fertile plains,

Preserves the sheep, and o'er the shepherds reigns:

For him our yearly wakes and feasts we hold,

And choose the fairest firslings from the fold;

He, good to all, who good deserves, shall give

Thy flock to feed, and thee at ease to live,

Shall curb the malice of unbridled tongues,

And bounteously reward thy rural songs.

Co. First, then, shall lightsome birds forget to fly,

The briny ocean turn to pastures dry,

And every rapid river cease to flow,

Ere I unmindful of Menalcas grow.

Th. This night thy care with me forget, and fold

Thy flock with mine, to ward th' injurious cold.

New milks, and clouted cream; mild cheese and curd,

With some remaining fruit of last year's hoard,

Shall be our ev'ning fare; and, for the night,

Sweet herbs and mofs, which gentle sleep invite:

And now behold the sun's departing ray,

O'er yonder hill, the sign of ebbing day:

With songs the jovial hinds return from plow;

And unyok'd heifers, loitering homeward, low.

68. Mr Pope's Pastorals next appeared, but in a

different dress from those of Spenser and Phillips;

for he has discarded all antiquated words, drawn his

swains more modern and polite, and made his numbers

exquisitely harmonious: his eclogues therefore may be called *better poems*, but not better pastorals. We shall insert the eclogue he has inscribed to Mr Wycherly the beginning of which is in imitation of Virgil's first pastoral.

Beneath the shade a spreading beech displays,

Hylas and Ægon sung their rural lays:

This mourn'd a faithless, that an absent love,

And Delia's name and Doris fill'd the grove.

Ye Mantuan nymphs, your sacred succour bring;

Hylas and Ægon's rural lays I sing.

Thou, whom the nine with Plautus' wit inspire,

The art of Terence, and Menander's fire:

Whose sense instructs us, and whose humour charms,

Whose judgment sways us, and whose spirit warms!

Oh, skill'd in nature! see the hearts of swains,

Their artless passions, and their tender pains.

Now setting Phœbus shone serenely bright,

And fleecy clouds were streak'd with purple light;

When tuneful Hylas, with melodious moan,

Taught rocks to weep, and made the mountains groan.

Go, gentle gales, and bear my sighs away!

To Delia's ear the tender notes convey.

As some sad turtle his lost love deplores,

And with deep murmurs fills the sounding shores;

Thus, far from Delia, to the winds I mourn,

Alike unheard, unpy'd, and forlorn.

Go, gentle gales, and bear my sighs along!

For her, the feather'd quires neglect their song;

For her, the limes their pleasing shades deny;

For her, the lilies hang their head and die.

Ye flow'rs, that droop, forsaken by the spring,

Ye birds, that left by summer cease to sing,

Ye trees, that fade when autumn heats remove,

Say, is not absence death to those who love?

Go, gentle gales, and bear my sighs away!

Curs'd be the fields that cause my Delia's stay:

Fade ev'ry blossom, wither ev'ry tree,

Die ev'ry flow'r, and perish all but she.

What I have said? where'er my Delia flies,

Let spring attend, and sudden flow'rs arise;

Let opening roses knotted oaks adorn,

And liquid amber drop from ev'ry thorn.

Go, gentle gales, and bear my sighs along!

The birds shall cease to tune their evening song,

The winds to breathe, the waving woods to move,

And streams to murmur, ere I cease to love.

Nor bubbling fountains to the thirsty swain,

Not balmy sleep to labourers faint with pain,

Nor show'rs to larks, or sunshine to bee,

Are half so charming as thy sight to me.

Go, gentle gales, and bear my sighs away!

Come, Delia, come; ah, why this long delay?

Thro' rocks and caves the name of Delia sounds;

Delia, each cave and echoing rock rebounds.

Ye pow'rs, what pleasing frenzy sooths my mind!

Do lovers dream, or is my Delia kind?

She comes, my Delia comes!—now cease, my lay;

And cease, ye gales, to bear my sighs away!

Next Ægon sung, while Windsor groves admir'd;

Rehearse, ye muses, what yourselves inspir'd.

Refound ye hills, refound my mournful strain!

Of perjur'd Doris, dying I complain:

Here

Here where the mountains, less'ning as they rise,
Lose the low vales, and steal into the skies;
While lab'ring oxen, spent with toil and heat,
In their loose traces from the field retreat;
While curling smokes from village-tops are seen,
And the fleet shades glide o'er the dusky green.

Refound, ye hills, resound my mournful lay!
Beneath yon poplar oft we pals'd the day:
Oft on the rind I carv'd her am'rous vows,
While she with garlands hung the bending boughs:
The garlands fade, the boughs are worn away;
So dies her love, and so my hopes decay.

Refound, ye hills, resound my mournful strain!
Now bright Arcturus glads the teeming grain;
Now golden fruits in loaded branches shine,
And grateful clusters swell with floods of wine;
Now blushing berries paint the yellow grove:
Just Gods! I shall all things yield returns but love?

Refound, ye hills, resound my mournful lay!
The shepherds cry, "Thy flocks are left a prey."
Ah! what avails it me the flocks to keep,
Who lost my heart, while I preserv'd my sheep?
Pan came, and ask'd, what magic caus'd my smart,
Or what ill eyes malignant glances dart?
What eyes but hers, alas! have pow'r to move?
And is there magic but what dwells in love?

Refound, ye hills, resound my mournful strains!
I'll fly from shepherds, flocks, and flow'ry plains.—
From shepherds, flocks, and plains, I may remove,
Forake mankind, and all the world—but love!
I know thee, love! wild as the raging main,
More fell than tygers on the Libyan plain:
Thou wert from Etna's burning entrails torn,
Got by fierce whirlwinds, and in thunder born.

Refound, ye hills, resound my mournful lay!
Farewel, ye woods, adieu the light of day!
One leap from yonder cliff shall end my pains.
No more, ye hills, no more resound my strains!
Thus sung the shepherds till th' approach of night,
The skies yet blushing with departing light,
When falling dews with spangles deck'd the glade,
And the low sun had lengthen'd ev'ry shade.

To these pastorals, which are written agreeably to the taste of antiquity, and the rules above prescribed, we shall beg leave to subjoin another that may be called *burlesque pastoral*, wherein the ingenious author, Mr Gay, has ventured to deviate from the beaten road, and described the shepherds and ploughmen of our own time and country, instead of those of the Golden Age, to which the modern critics confine the pastoral. His six pastorals, which he calls the *Shepherds' Week*, are a beautiful and lively representation of the manners, customs, and notions of our rustics. We shall insert the first of them, entitled, *The Squabble*, wherein two clowns try to out-do each other in singing the praises of their sweet-hearts, leaving it to a third to determine the controversy. The persons named are *Lobbin Clout*, *Cuddy*, and *Cloddipole*.

Lob. Thy younglings, Cuddy, are but just awake;
No thro'le shrill the bramble-bush forake;
No chirping lark the welkin seen * invokes;
No damsel yet the swelling under strokes;
O'er yonder hill does scant † the dawn appear;
Then why does Cuddy leave his cott so rear ‡?

Cud. Ah Lobbin Clout! I ween † my plight is guest;
For he that loves, a stranger is to rest.
If swains belye not, thou hast prov'd the smart,
And Blouzalinda's mistress of thy heart.
This rising rear betokeneth well thy mind;
Those arms are folded for thy Blouzalind.
And well, I trow, our piteous plights agree;
Thee Blouzalinda smites, Buxoma me.

Lob. Ah Blouzalind! I love thee more by half,
Than deer their fawns, or cows the new-fall'n calf.
Woe worth the tongue, may blisters fore it gail,
That names Buxoma Blouzalind withal!

Cud. Hold, witless Lobbin Clout! I thee advise,
Left blisters fore on thy own tongue arise.
Lo yonder Cloddipole, the blithsome swain,
The wisest lout of all the neighb'ring plain!
From Cloddipole we learnt to read the skies,
To know when hail will fall, or winds arise.
He taught us erst * the heifer's tail to view,
When stuck aloft, that show'rs would straight ensue:
He first that useful secret did explain,
That pricking corns foretold the gath'ring rain.
When swallows fleet soar high and sport in air,
He told us that the welkin would be clear.
Let Cloddipole then hear us twain rehearse,
And praise his sweet-heart in alternate verse.
I'll wager this same oaken staff with thee,
That Cloddipole shall give the prize to me.

Lob. See this tobacco-pouch, that's lin'd with hair,
Made of the skin of sleekest fallow-deer:
This pouch, that's tied with tape of reddest hue,
I'll wager, that the prize shall be my due.

Cud. Begin thy carols then, thou vaunting frouch;
Be thine the oaken staff, or mine the pouch.

Lob. My Blouzalinda is the blithest lass,
Than primrose sweeter, or the clover-grass.
Fair is the king-cup that in meadow blows,
Fair is the daisy that beside her grows;
Fair is the gilly-flow'r of gardens sweet,
Fair is the marygold, for pottage meet;
But Blouzalind's than gilly-flow'r more fair,
Than daisy, marygold, or king-cup rare.

Cud. My brown Buxoma is the fatest maid
That e'er at wake delightfome gambol play'd;
Clean as young lambkins, or the goose's down,
And like the goldfinch in her Sunday gown.
The witless lamb may sport upon the plain,
The frisking kid delight the gaping swain;
The wanton calf may skip with many a bound,
And my cur Tray play deffest † feats around:
But neither lamb, nor kid, nor calf, nor Tray,
Dance like Buxoma on the first of May.

Lob. Sweet is my toil when Blouzalind is near;
Of her benefit, 'tis winter all the year.
With her no sultry summer's heat I know;
In winter, when she's nigh, with love I glow.
Come, Blouzalinda, zate thy swain's desire,
My summer's shadow, and my winter's fire!

Cud. As with Buxoma once I work'd at hay,
E'en noon-tide labour seem'd an holiday;
And holidays, if haply she were gone,
Like worky-days I wish'd would soon be done.
Eftsoons ‡, O sweet-heart kind, my love repay,
And all the year shall then be holiday.

Lob.

* Shining
or bright
fly.
‡ Scarce.
† Early.

* Formerly

† Nimblest.

‡ Very soon.

Pastoral.

Lob. As Blouzalinda, in a gamefome mood,
Behind a bay-cock loudly laughing flood,
I dilly ran and snatched a hasty kiſs;
She wip'd her lips, nor took it much amiſs.
Believe me, Cuddy, while I'm bold to fay,
Her breath was ſweeter than the ripen'd hay.

*Vagabondy

Cud. As my Buxoma, in a morning fair,
With gentle finger ſtroak'd her milky care,
I quaintly * ſtole a kiſs; at fiſt, 'tis true,
She frown'd, yet after granted one or two.
Lobbin, I ſwear, believe who will my vows,
Her breath by far excell'd the breathing cows.

Lob. Leek to the Welch, to Dutchmen butter's dear,
Of Iriſh ſwains potatoes are the cheer;
Oats for their ſeats the Scottiſh ſhepherds grind,
Sweet turnips are the food of Blouzalind:
While ſhe loves turnips, butter I'll deſpise,
Nor leeks, nor oatmeal, nor potatoes prize.

Cud. In good roaſt-beef my landlord ſticks his knife,
The capon fat delights his dainty wife;
Pudding our parſon eats, the ſquire loves here;
But white-pot thick is my Buxoma's fare.
While ſhe loves white-pot, capon ne'er ſhall be,
Nor hare, nor beef, nor pudding, food for me.

Lob. As once I play'd at blind-man's buff, it hapt
About my eyes the towel thick was wrapt:
I miſ'd the ſwains, and ſeiz'd on Blouzalind;
True ſpeaks that ancient proverb, Love is blind.

Cud. As at hot-cockles once I laid me down,
And felt the weighty hand of many a clown;
Buxoma gave a gentle tap, and I
Quick roſe, and read ſoft miſchief in her eye.

Lob. On two near elms, the ſlacken'd cord I hung;
Now high, now low, my Blouzalinda ſwung:
With the rude wind her rump'd garment roſe,
And ſhow'd her taper leg and ſcarlet hoſe.

Cud. Acroſs the fallen oak the plank I laid,
And myſelf poiſ'd againſt the tott'ring maid:
High leapt the plank, and down Buxoma fell;
I ſpy'd—but faithful ſweethearts never tell.

Lob. This riddle, Cuddy, if thou canſt, explain,
This wily riddle puzzles ev'ry ſwain:

*Marygoll. *What flower's that which bears the virgin's name,
The richeſt metal join'd with the ſame * ?*

Cud. Anſwer, thou carle, and judge this riddle right,
I'll frankly own thee for a cunning wight:

†Roſemary. *What flower's that which royal honour craves,
Adjoin the virgin, and 'tis ſrown on graves † ?*

Cud. Forbear, contenting ſlouts, give o'er your ſtrains;
An oaken ſtaff each merits for his pains.
But ſee the ſun-beams bright to labour warn,
And gild the thatch of Goodman Hodge's barn.
Your herds for want of water ſtand a-dry;
They're weary of your ſongs—and fo am I.

We have given the rules uſually laid down for paſtoral writing, and exhibited ſome examples which were written on this plan; but we have to obſerve, that this poem may ſometimes partake of more dignity, and aſpire even to the ſublime, without deviating from nature and right reaſon. The ſublime which ariſes from tumults, wars, and what are too often falſely called *great actions*, the paſtor abhors; but that which is blended with the tender and pathetic may be introduced with propriety and elegance. And indeed

if we conſider that the fiſt ſhepherds were many of them prieces, (for that Abraham, Moſes, and David, were ſuch, we have the teſtimony of the Scriptures), it will ſeem ſomewhat extraordinary that ſuch pains ſhould have been taken to exclude the ſublime from paſtoral writing; and we ſhall be inclined to admit Virgil's *Pellio*, the *Song of Solomon*, and Pope's *Meſſiah*, as paſtorals, till better reaſons are offered to the contrary than have yet appear'd: for the true characteriſtic of paſtoral, and what diſtinguiſhes it from other writings, is its ſole confinement to rural affairs; and if this be obſerved, it can loſe nothing of its nature by any elevation of ſentiment or diſtion.

SECT. V. Of Didactic or Preceptive Poetry.

69. THE method of writing precepts in verſe, and embellishing them with the graces of poetry, had its riſe, we may ſuppoſe, from a due conſideration of the frailties and perverseneſs of human nature; and was intended to endow the affections, in order to improve the mind and amend the heart.

Didactic or preceptive poetry, has been uſually employed either to illuſtrate and explain our moral duties, our philoſophical inquiries, our buſineſs and pleaſures; or in teaching the art of criticism or poetry itſelf. It may be adapted, however, to any other ſubject; and may in all caſes, where inſtruction is deſigned, be employed to good purpoſe. Some ſubjects, indeed, are more proper than others, as they admit of more poetical ornaments, and give a greater latitude to genius: but whatever the ſubject is, thoſe precepts are to be laid down that are the moſt uſeful; and they ſhould follow each other in a natural eaſy method, and be delivered in the moſt agreeable engaging manner. What the proſe writer tells you ought to be done, the poeſt often conveys under the form of a narration, or ſhows the neceſſity of in a deſcription; and by repreſenting the action as done, or doing, conceals the precept that ſhould enforce it. The poeſt likewiſe, inſtead of telling the whole truth, or laying down all the rules that are requiſite, ſelects ſuch parts only as are the moſt pleaſing, and communicates the reſt indirectly, without giving us an open view of them; yet takes care that nothing ſhall eſcape the reader's notice with which he ought to be acquainted. He diſcloſes juſt enough to lead the imagination into the parts that are conceal'd; and the mind, ever gratified with its own diſcoveries, is complimented with exploring and finding them out; which, though done with eaſe, ſeems to be conſiderable, as not to be obtained but in conſequence of its own adroitness and ſagacity.

But this is not ſufficient to render didactic poetry always pleaſing: for where precepts are laid down one after another, and the poem is of conſiderable length, the mind will require ſome recreation and reſreſhment by the way; which is to be procured by ſeaſonable moral reflections, pertinent remarks, familiar ſimiles, and deſcriptions naturally introduced, by alluſions to ancient hiſtories or fables, and by ſhort and pleaſant digreſſions and excuſions into more noble ſubjects, ſo aptly brought in, that they may ſeem to have a remote relation, and be of a piece with the poem. By thus varying the form of inſtruction, the poeſt gives life to his precepts, and awakens and ſecures our attention, without permitting us to ſee by what means we

Didactic.

Didactic.

are thus captivated : and his art is the more to be admired, because it is so concealed as to escape the reader's observation.

The style, too, must maintain a dignity suitable to the subject, and every part be drawn in such lively colours, that the things described may seem as if presented to the reader's view.

But all this will appear more evident from example; and though entire poems of this kind are not within the compass of our design, we shall endeavour to select such passages as will be sufficient to illustrate the rules we have here laid down.

We have already observed, that, according to the usual divisions, there are four kinds of didactic poems, viz. those that respect our moral duties, our philosophical speculations, our business and pleasures, or that give precepts for poetry and criticism.

70. On the first subject, indeed, we have scarce any thing that deserves the name of poetry, except Mr Pope's *Essay on Man*, and his *Ethic Epistles*; to which therefore we refer as examples.

71. II. Those preceptive poems that concern philosophical speculations, though the subject is so pregnant with matter, affords such a field for fancy, and is so capable of every decoration, are but few. Lucretius is the most considerable among the ancients who has written in this manner; and among the moderns we know of none but small detached pieces, except the poem called *Anti-Lucretius*, which has not yet received an English dress, and Dr Akenfide's *Pleasures of the Imagination*; both which are worthy of our admiration. Some of the small pieces are also well executed; and there is one entitled the *Universe*, written by Mr Baker, from which we shall borrow an example.

The author's scheme is in some measure coincident with Mr Pope's, so far especially as it tends to restrain the pride of man, with which design it was professedly written.

The passage we have selected is that respecting the planetary system.

Unwife! and thoughtless! impotent! and blind!
Can wealth, or grandeur, satisfy the mind?
Of all those pleasures mortals most admire,
Is there one joy sincere, that will not tire?
Can love itself endure? or beauty's charms
Afford that bliss we fancy in its arms?—
Then, let thy soul more glorious aims pursue:
Have thy CREATOR and his works in view.
Be these thy study: hence thy pleasures bring;
And drink large draughts of wisdom from its spring;
That spring, whence perfect joy, and calm repose,
And blest content, and peace eternal, flows.

Observe how regular the Planets run,
In stated times, their courses round the Sun.
Different their bulk, their distance, their career,
And different much the compass of their year:

Yet all the same eternal laws obey,
While God's unerring finger points the way.

First Mercury, amidst full tides of light,
Rolls next the sun, through his small circle bright.
All that dwell here must be resign'd and pure:
Bodies like ours such ardour can't endure:
Our Earth would blaze beneath so fierce a ray,
And all its marble mountains melt away.

Fair Venus, next, fulfils her larger round,
With softer beams, and milder glory crown'd.
Friend to mankind, she glitters from afar,
Now the bright ev'ning, now the morning star.

More distant still, our Earth comes rolling on,
And forms a wider circle round the sun:
With her the Moon, companion ever dear!
Her course attending through the shining year.

See, Mars, alone, rous his appointed race,
And measures out, exact, the destin'd space:
Nor nearer does he wind, nor farther stray,
But finds the point whence first he roll'd away.

More yet remote from day's all-cheering source,
Vast Jupiter performs his constant course:
Four friendly moons, with borrow'd lustre, rise,
Beslow their beams benign, and light his skies.

Farthest and last, scarce warm'd by Phœbus' ray,
Through his vast orbit Saturn wheels away.
How great the change could we be wafted there!
How slow the seasons! and how long the year!

One moon, on us, reflects its cheerful light:
There, five attendants brighten up the night.
Here, the blue firmament bedeck'd with stars,
There, over-head, a lucid arc appears,
From hence how large, how strong, the sun's bright ball!
But seen from thence, how languid and how small!—
When the keen north with all its fury blows,
Congeals the floods, and forms the fleecy snows,
'Tis heat intense to what can there be known:
Warmer our poles than is its burning zone.

Who there inhabit must have other pow'rs,
Juices, and veins, and sense, and life, than ours.
One moment's cold, like theirs, would pierce the bone,
Freeze the heart-blood, and turn us all to stone.

Strange and amazing must the difference be,
'Twixt this dull Planet and bright Mercury:
Yet reason says, nor can we doubt at all,
Millions of beings dwell on either ball,
With constitutions fitted for that spot,
Where Providence, all-wise, has fix'd their lot.

Wond'rous art thou, O God, in all thy ways!
Their eyes to thee let all thy creatures raise:
Adore thy grandeur, and thy goodness praise.

Ye sons of men! with satisfaction know,
God's own right hand dispenses all below:
Nor good nor evil does by chance befall;
He reigns supreme, and he directs it all.

At his command, affrighting human-kind,
Comets drag on their blazing lengths behind:
Nor, as we think, do they at random rove,
But, in determin'd times, through long ellipses move.
And tho' sometimes they near approach the sun,
Sometimes beyond our system's orbit run;
Throughout their race they act their Maker's will,
His pow'r declare, his purposes fulfil.

72. III. Of those preceptive poems that treat of the business and pleasures of mankind, Virgil's *Georgics* claims our first and principal attention. In these he has laid down the rules of husbandry in all its branches with the utmost exactness and perspicuity, and at the same time embellished them with all the beauties and graces of poetry. Though his subject was husbandry, he has delivered his precepts, as Mr Addison observes, not with the simplicity of a ploughman, but with the address

addresses of a poet: the meanest of his rules are laid down with a kind of grandeur; and he breaks the clods, and tosses about the dung, with an air of gracefulness. Of the different ways of conveying the same truth to the mind, he takes that which is pleasiest; and this chiefly distinguishes poetry from prose, and renders Virgil's rules of husbandry more delightful and valuable than any other.

These poems, which are esteemed the most perfect of the author's works, are, perhaps, the best that can be proposed for the young student's imitation in this manner of writing; for the whole of his *Georgics* is wrought up with wonderful art, and decorated with all the flowers of poetry.

74. IV. Of those poems which give precepts for the recreations and pleasures of a country life, we have several in our own language that are justly admired. As the most considerable of those diversions, however, are finely treated by Mr Gay in his *Rural Sports*, we particularly refer to that poem.

We should here treat of those preceptive poems that teach the art of poetry itself, of which there are many that deserve particular attention; but we have anticipated our design, and rendered any farther notice of them in a manner useless, by the observations we have made in the course of this treatise. We ought however to remark, that Horace was the only poet among the ancients who wrote precepts for poetry in verse: at least his epistle to the Pisos is the only piece of the kind that has been handed down to us; and that is so perfect, it seems almost to have precluded the necessity of any other. Among the moderns we have several that are justly admired; as Boileau, Pope, &c.

74. Poets who write in the preceptive manner should take care to choose such subjects as are worthy of their muse, and of consequence to all mankind; for to bestow both parts and pains to teach people trifles that are unworthy of their attention, is to the last degree ridiculous.

Among poems of the useful and interesting kind, Dr Armstrong's *Art of Preserving Health* deserves particular recommendation, as well in consideration of the subject, as of the elegant and masterly manner in which he has treated it; for he has made those things, which are in their own nature dry and unentertaining, perfectly agreeable and pleasing, by adhering to the rules observed by Virgil and others, in the conduct of these poems.

75. With regard to the style or dress of these poems, it should be so rich as to hide the nakedness of the subject, and the barrenness of the precepts should be lost in the lustre of the language. "It ought to abound in the most bold and forcible metaphors, the most glowing and picturesque epithets; it ought to be elevated and enlivened by pomp of numbers and majesty of words, and by every figure that can lift a language above the vulgar and current expressions." One may add, that in no kind of poetry (not even in the sublime ode) is beauty of expression so much to be regarded as in this. For the epic writer should be very cautious of indulging himself in too florid a manner of expression, especially in the dramatic parts of his fable, where he introduces dialogue: and the writer of tragedy cannot fall into so nauseous and unnatural an affect.

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fection, as to put laboured descriptions, pompous epithets, studied phrases, and high-flown metaphors, into the mouths of his characters. But as the didactic poet speaks in his own person, it is necessary and proper for him to use a brighter colouring of style, and to be more studious of ornament. And this is agreeable to an admirable precept of Aristotle, which no writer should ever forget,—"That diction ought most to be laboured in the unactive, that is, the descriptive, parts of a poem, in which the opinions, manners, and passions of men are not represented; for too glaring an expression obscures the manners and the sentiments."

We have already observed that any thing in nature may be the subject of this poem. Some things however will appear to more advantage than others, as they give a greater latitude to genius, and admit of more poetical ornaments. Natural history and philosophy are copious subjects. Precepts in these might be decorated with all the flowers in poetry; and, as Dr Trapp observes, how can poetry be better employed, or more agreeably to its nature and dignity, than in celebrating the works of the great Creator, and describing the nature and generation of animals, vegetables, and minerals; the revolutions of the heavenly bodies; the motions of the earth; the flux and reflux of the sea; the cause of thunder, lightning, and other meteors; the attraction of the magnet; the gravitation, cohesion, and repulsion of matter; the impulsive motion of light; the slow progression of sounds; and other amazing phenomena of nature. Most of the arts and sciences are also proper subjects for this poem; and none are more so than its two sister arts, painting and music. In the former, particularly, there is room for the most entertaining precepts concerning the disposal of colours; the arrangement of lights and shades; the secret attractives of beauty; the various ideas which make up the one; the distinguishing between the attitudes proper to either sex, and every passion; the representing prospects of buildings, battles, or the country; and lastly, concerning the nature of imitation, and the power of painting. What a boundless field of invention is here? What room for description, comparison, and poetical fable? How easy the transition, at any time, from the draught to the original, from the shadow to the substance? and from hence, what noble excursions may be made into history, into panegyric upon the greatest beauties or heroes of the past or present age?

SECT. VII. Of the Epistle.

76. THIS species of writing, if we are permitted to lay down rules from the examples of our best poets, admits of great latitude, and solicits ornament and decoration: yet the poet is still to consider that the true character of the epistle is ease and elegance; nothing therefore should be forced or unnatural, laboured, or affected, but every part of the composition breathe an easy, polite, and unconstrained freedom.

It is suitable to every subject; for as the epistle takes place of discourse, and is intended as a sort of distant conversation, all the affairs of life and researches into nature may be introduced. Those, however, which are fraught with compliment or condolence, that

Epistle.

Epistle.

contain a description of places, or are full of pertinent remarks, and in a familiar and humorous way describe the manners, vices, and follies of mankind, are the best; because they are most suitable to the true character of epistolary writing, and (business set apart) are the usual subjects upon which our letters are employed.

All farther rules and directions are unnecessary; for this kind of writing is better learned by example and practice, than by precept. We shall therefore, in conformity to our plan, select a few epistles for the reader's imitation; which, as this method of writing has of late much prevailed, may be best taken, perhaps, from our modern poets.

77. The following letter from Mr Addison to lord Halifax, contains an elegant description of the curiosities and places about Rome, together with such reflections on the inestimable blessings of liberty as must give pleasure to every Briton, especially when he sees them thus placed in direct opposition to the baneful influence of slavery and oppression which are ever to be seen among the miserable inhabitants of those countries.

While you, my lord, the rural shades admire,
And from Britannia's public posts retire,
Nor longer, her ungrateful sons to please,
For their advantage sacrifice your ease;
Me into foreign realms my fate conveys,
Through nations fruitful of immortal lays,
Where the soft season and inviting clime
Conspire to trouble your repose with rhyme.

For wheresoe'er I turn my ravish'd eyes,
Gay gilded scenes and shining prospects rise,
Poetic fields encompass me around,
And still I seem to tread on classic ground;
For here the muse so oft her harp has strung,
That not a mountain rears its head unsung,
Renown'd in verse each shady thicket grows,
And ev'ry stream in heav'nly numbers flows.

How am I pleas'd to search the hills and woods
For rising springs and celebrated floods;
To view the Nar, tumultuous in his course,
And trace the smooth Clitumnus to his source;
To see the Mincio draw his wat'ry store
Through the long windings of a fruitful shore,
And hoary Albulæ's infected tide
O'er the warm bed of smoking sulphur glide!

Fir'd with a thousand raptures, I survey
Eridanus through flow'ry meadows stray,
The king of floods! that, rolling o'er the plains,
The towering Alps of half their moisture drains,
And, proudly swoln with a whole winter's snows,
Distributes wealth and plenty where he flows.

Sometimes, misguided by the tuneful throng,
I look for streams immortaliz'd in song,
That lost in silence and oblivion lie,
(Dumb are their fountains and their channels dry)
Yet run for ever by the muse's skill,

And in the smooth description murmur still.

Sometimes to gentle Tiber I retire,
And the fam'd river's empty shores admire,
That, destitute of strength, derives its course
From thirsty urns, and an unfruitful source;

Yet sung so often in poetic lays,
With scorn the Danube and the Nile surveys;
So high the deathless muse exalts her theme!
Such was the Boyn, a poor inglorious stream,
That in Hibernian vales obscurely stray'd,
And unobserv'd in wild meanders play'd;
Till, by your lines and Nassau's sword renown'd,
Its rising billows through the world resound,
Where'er the hero's godlike acts can pierce,
Or where the fame of an immortal verse.

Oh cou'd the muse my ravish'd breast inspire
With warmth like yours, and raise an equal fire,
Unnumber'd beauties in my verse should shine,
And Virgil's Italy should yield to mine!

See how the golden groves around me smile,
That shun the coasts of Britain's stormy isle,
Or when transplanted and preserv'd with care,
Curse the cold clime, and starve in northern air.
Here kindly warmth their mounting juice ferments
To nobler tastes, and more exalted scents:
Ev'n the rough rocks with tender myrtles bloom,
And trodden weeds send out a rich perfume.
Bear me, some god, to Baia's gentle seats,
Or cover me in Umbria's green retreats;
Where western gales eternally reside,
And all the seasons lavish all their pride:
Blossoms, and fruits, and flow'rs together rise,
And the whole year in gay confusion lies.

Immortal glories in my mind revive,
And in my soul a thousand passions strive,
When Rome's exalted beauties I descry
Magnificent in piles of ruin lie.
An amphitheatre's amazing height
Here fills my eye with terror and delight,
That on its public shows unpeopled Rome,
And held uncrowded nations in its womb:
Here pillars rough with sculpture pierce the skies;
And here the proud triumphal arches rise,
Where the old Romans deathless acts, display'd,
Their base degenerate progeny upbraid:
Whole rivers here forsake the fields below,
And wond'ring at their height thro' airy channels flow.

Still to new scenes my wand'ring muse retires;
And the dumb show of breathing rocks admires;
Where the smooth chisel all its force has shown,
And soften'd into flesh the rugged stone.
In solemn silence, a majestic band,
Heroes, and gods, and Roman consuls stand,
Stern tyrants, whom their cruelties renown,
And emperors in Parian marble frown;
While the bright dames, to whom they humbly su'd,
Still show the charms that their proud hearts subdu'd.

Fain would I Raphael's godlike art rehearse,
And show th' immortal labours in my verse,
Where from the mingled strength of shade and light
A new creation rises to my sight,
Such heav'nly figures from his pencil flow,
So warm with life his blended colours glow.
From theme to theme with secret pleasure tost,
Amidst the soft variety I'm lost.
Here pleasing airs my ravish'd soul confound
With circling notes and labyrinths of sound;
Here domes and temples rise in distant views,
And opening palaces invite my muse.

How

Epistle.

Epistle.

How has kind heav'n adorn'd the happy land,
And scatter'd blessings with a wasteful hand !
But what avail her unexhausted stores,
Her blooming mountains, and her funny shores,
With all the gifts that heav'n and earth impart,
The smiles of nature, and the charms of art,
While proud oppression in her valleys reigns,
And tyranny usurps her happy plains ?
The poor inhabitant beholds in vain
The red'ning orange and the swelling grain :
Joyless he sees the growing oils and wines,
And in the myrtle's fragrant shade repines :
Starves, in the midst of nature's bounty curst,
And in the loaden vineyard dies for thirst.

O liberty, thou goddess heav'nly bright,
Profuse of bliss, and pregnant with delight !
Eternal pleasures in thy presence reign,
And smiling plenty leads thy wanton train ;
Eas'd of her load, subjection grows more light,
And poverty looks cheerful in thy sight ;
Thou mak'st the gloomy face of nature gay,
Giv'st beauty to the sun, and pleasure to the day.

Thou, goddess, thee, Britannia's isle adores ;
How has the oft exhausted all her stores,
How oft in fields of death thy presence fought,
Nor thinks the mighty prize too dearly bought !
On foreign mountains may the sun refine
The grape's soft juice, and mellow it to wine,
With citron groves adorn a distant soil,
And the fat olive swell with floods of oil :
We envy not the warmer clime, that lies
In ten degrees of more indulgent skies,
Nor at the coarseness of our heav'n repine,
Though o'er our heads the frozen pleiads shine :
'Tis liberty that crowns Britannia's isle, [smile.
And makes her barren rocks and her bleak mountains

Others with tow'ring piles may please the fight,
And in their proud aspiring domes delight ;
A nicer touch to the stretch'd canvas give,
Or teach their animated rocks to live :
'Tis Britain's care to watch o'er Europe's fate,
And hold in balance each contending state,
To threaten bold presumptuous kings with war,
And answer her afflicted neighbour's pray'r.
The Dane and Swede, rous'd up by fierce alarms,
Bless the wise conduct of her pious arms :
Soon as her fleets appear, their terrors cease,
And all the northern world lies hush'd in peace.

Th' ambitious Gaul beholds with secret dread
Her thunder aim'd at his aspiring head
And fain her godlike sons would disunite
By foreign gold, or by domestic spite ;
But strives in vain to conquer or divide,
Whom Nassau's arms defend and counsel guide.

Fir'd with the name, which I so oft have found
The distant climes and diff'rent tongues resound,
I bridle in my struggling muse with pain,
That longs to lanch into a bolder strain.
But I've already troubled you too long,
Nor dare attempt a more advent'rous song :
My humble verse demands a softer theme,
A painted meadow, or a purling stream ;
Unfit for heroes ; whom immortal lays,
And lines like Virgil's, or like yours, should praise.

78. There is a fine spirit of freedom, and love of liberty, displayed in the following letter from lord Lyttelton to Mr Pope ; and the message from the shade of Virgil, which is truly poetical, and justly preceptive, may prove an useful lesson to future bards.

From Rome, 1730.

IMMORTAL bard ! for whom each muse has wove
The fairest garlands of the Aonian grove ;
Preserv'd, our drooping genius to restore,
When Addison and Congreve are no more ;
After so many stars extinct in night,
The darken'd age's last remaining light !
To thee from Latian realms this verse is writ,
Inspir'd by memory of ancient wit :
For now no more these climes their influence boast,
Fall'n is their glory, and their virtue lost ;
From tyrants, and from priests, the muses fly,
Daughters of reason and of liberty.

Nor Baie nor Umbria's plain they love,
Nor on the banks of Nar or Mincia rove ;
To Thames's flow'ry borders they retire,
And kindle in thy breast the Roman fire.
So in the shades, where cheer'd with summer rays
Melodious linnets warbled sprightly lays,
Soon as the faded, falling leaves complain
Of gloomy winter's un auspicious reign,
No tuneful voice is heard of joy or love,
But mournful silence fadens all the grove.

Unhappy Italy ! whose alter'd state
Has felt the worst severity of fate :
Not that barbarian hands her faices broke,
And bow'd her haughty neck beneath their yoke ;
Nor that her palaces to earth are thrown,
Her cities desert, and her fields unfown ;
But that her ancient spirit is decay'd,
That sacred wisdom from her bosom is fled,
That there the source of science flows no more,
Whence its rich streams supply'd the world before.

Illustrious names ! that once in Latium shin'd,
Born to instruct and to command mankind ;
Chiefs, by whose virtue mighty Rome was rais'd,
And poets, who those chiefs sublimely prais'd !
Oft I the traces you have left explore,
Your ashes visit, and your urns adore ;
Oft kiss, with lips devout, some mould'ring stone,
With ivy's venerable shade o'ergrown ;
Those hallow'd ruins better pleas'd to see,
Than all the pomp of modern luxury.

As late on Virgil's tomb fresh flow'rs I strow'd,
While with th' inspiring muse my bosom'd glow'd,
Crown'd with eternal bays, my ravish'd eyes
Beheld the poet's awful form arise :
Stranger, he said, whose pious hand has paid
These grateful rites to my attentive shade,
When thou shalt breathe thy happy native air,
To Pope this message from his master bear.

Great bard, whose numbers I myself inspire,
To whom I gave my own harmonious lyre,
If high exalted on the throne of wit,
Near me and Homer thou aspire to sit,
No more let meaner satire dim the rays
That flow majestic from thy noble bays.
In all the flow'ry paths of Pindus stray :

But shun that thorny, that unpleasing way ;
Nor, when each soft engaging muse is thine,
Adds the least attractive of the nine.

Of thee more worthy were the task to raise
A lasting column to thy country's praise,
To sing the land, which yet alone can boast
That liberty corrupted Rome has lost ;
Where science in the arms of peace is laid,
And plants her palm beneath the olive's shade.
Such was the theme for which my lyre I strung,
Such was the people whose exploits I sung ;
Brave, yet refin'd, for arms and arts renown'd,
With different bays by Mars and Phœbus crown'd,
Dauntless opposers opposers of tyrannic sway,
But pleas'd a mild Augustus to obey.

If these commands submissive thou receive,
Immortal and unblam'd thy name shall live ;
Envy to black Cocytus shall retire,
And howl with furies in tormenting fire ;
Approving time shall consecrate thy lays,
And join the patriot's to the poet's praise.

79. The great use of medals is properly described in the ensuing elegant epistle from Mr Pope to Mr Addison ; and the extravagant passion which some people entertain only for the colour of them, is very agreeably and very justly ridiculed.

See the wild waste of all devouring years !
How Rome her own sad sepulchre appears !
With nodding arches, broken temples spread !
The very tombs now vanish like their dead !
Imperial wonders rais'd on nations spoil'd,
Where mix'd with slaves the groaning martyr toil'd !
Huge theatres, that now unpeopled woods,
Now drain'd a distant country of her floods !
Fanes, which admiring gods with pride survey,
Statues of men, scarce less alive than they !
Some felt the silent stroke of mould'ring age,
Some hostile fury, some religious rage ;
Barbarian blindness, Christian zeal conspire,
And Papal piety, and Gothic fire.
Perhaps, by its own ruin sav'd from flame,
Some bury'd marble half preserves a name ;
That name the learn'd with fierce disputes pursue,
And give to Titus old Vespasian's due.

Ambition sigh'd : She found it vain to trust
The faithless column and the crumbling butt ;
Huge moles, whose shadow stretch'd from shore to shore,
Their ruins perish'd, and their place no more !
Convinc'd, she now contracts her vast design,
And all her triumphs shrinks into a coin.
A narrow orb each crowded conquest keeps,
Beneath her palm here sad Judæa weeps ;
Now scantier limits the proud arch confine,
And scarce are seen the prostrate Nile or Rhine ;
A small Euphrates through the piece is roll'd,
And little eagles waves their wings in gold.

The medal, faithful to its charge of fame,
Through climes and ages bears each form and name :
In one short view subjected to our eye,
Gods, emperors, heroes, sages, beauties, lie,
With sharpen'd sight pale antiquaries pore,
The inscription value, but the rust adore.

This the blue varnish, that the green endears,
The sacred rust of twice ten hundred years !
To gain Prefœcennius one employs his schemes,
One grasps a Cæcrops in ecstasie dreams.
Poor Vadius, long, with learned spleen devour'd,
Can taste no pleasure since his shield was scour'd :
And Curio, restless by the fair one's side,
Sighs for an Otho, and neglects his bride.

Theirs is the vanity, the learning thine :
Touch'd by thy hand, again Rome's glories shine ;
Her gods and god-like heroes rise to view,
And all her faded garlands bloom anew.
Nor blush these studies thy regard engage ;
These pleas'd the fathers of poetic rage ;
The verse and sculpture bore an equal part,
And art reflected images to art.

Oh when shall Britain, conscious of her claim,
Stand emulous of Greek and Roman fame ?
In living medals see her wars enroll'd,
And vanquish'd realms supply recording gold ?
Here, rising bold, the patriot's honest face ;
There, warriors frowning in historic brass ?
Then future ages with delight shall see
How Plato's, Bacon's, Newton's looks agree ;
Or in fair series laurel'd bards be shown,
A Virgil there, and here an Addison.
Then shall thy Craggs (and let me call him mine)
On the cast ore, another Pollio shine ;
With aspect open shall erect his head,
And round the orb in lasting notes be read,
" Statesman, yet friend to truth ! of soul sincere,
" In action faithful, and in honour clear ;
" Who broke no promise, serv'd no private end,
" Who gain'd no title, and who lost no friend ;
" Ennobled by himself, by all approv'd,
" Prais'd, wept, and honour'd, by the muse he lov'd.

80. The following letter from Mr Philips to the earl of Dorset is entirely descriptive ; but is one of those descriptions which will be ever read with delight.

Copenhagen, March 9. 1709.

FROM frozen climes, and endless tracts of snow,
From streams which northern winds forbid to flow,
What present shall the muse to Dorset bring,
Or how, so near the pole, attempt to sing ?
The hoary winter here conceals from sight
All pleasing objects which to verse invite.
The hills and dales, and the delightful woods,
The flow'ry plains, and silver streaming floods,
By snow disguis'd, in bright confusion lie,
And with one dazzling waste fatigue the eye.

No gentle breathing breeze prepares the spring,
No birds within the desert region sing :
The ships, unmov'd, the boisterous winds defy,
While rattling chariots o'er the ocean fly.
The vast Leviathan wants room to play,
And spout his waters in the face of day ;
The starving wolves along the main sea spawl,
And to the moon in icy valleys howl.
O'er many a shining league the level main
Here spreads itself into a glassy plain :

There

Epistle.

There solid billows of enormous size,
Alps of green ice, in wild disorder rise.
And yet but lately have I seen, ev'n here,
The winter in a lovely dress appear.
'Ere yet the clouds let fall the treasur'd snow,
Or winds begin through hazy skies to blow,
At ev'ning a keen eastern breeze arose,
And the descending rain unfeel'd froze;
Soon as the silent shades of night withdrew,
The ruddy morn disclos'd at once to view
The face of nature in a rich disguise,
And brighten'd ev'ry object to my eyes:
For ev'ry shrub, and ev'ry blade of grass,
And ev'ry pointed thorn, seem'd wrought in glass;
In pearls and rubies rich the hawthorns shew,
While through the ice the crimson berries glow.
The thick-sprung reeds, which watery marshes yield,
Seem'd polish'd lances in a hostile field.
The flag in limpid currents with surprise,
Sees crystal branches on his forehead rise:
The spreading oak, the beech, and tow'ring pine,
Glaz'd over, in the freezing æther shine.
The frighted birds the rattling branches shun,
Which wave and glitter in the distant fun.

When if a sudden gust of wind arise,
The brittle forest into atoms flies,
The crackling woods beneath the tempest bends,
And in a spangled shower the prospect ends:
Or, if a southern gale the region warm,
And by degrees unbend the wintry charm,
The traveller a miry country fees,
And journey sad beneath the dropping trees:
Like some deluded peasant Merlin leads
Through fragrant bow'rs and through delicious meads,
While here enchanted gardens to him rise,
And airy fabrics there attract his eyes,
His wandering feet the magic paths pursue,
And while he thinks the fair illusion true,
The trackless scenes disperse in fluid air,
And woods, and wilds, and thorny ways appear,
A tedious road the weary wretch returns,
And, as he goes, the transient vision mourns.

81. We have already observed that the essential, and indeed the true characteristic of epistolary writing is ease; and on this account, as well as others, the following letter from Mr Pope to Miss Blount is to be admired.

To Miss Blount, on her leaving the Town after the Coronation.

As some fond virgin, whom her mother's care
Drags from the town to wholesome country air;
Just when she learns to roll a melting eye,
And hear a spark, yet think no danger nigh;
From the dear man unwilling she must sever,
Yet takes one kiss before she parts for ever:
Thus from the world fair Zephialinda flew,
Saw others happy, and with sighs withdrew:
Not that their pleasures caus'd her discontent;
She sigh'd not that they stay'd, but that she went.

She went, to plain-work, and to purling brooks,
Old-fashion'd halls, dull aunts, and croaking rooks:
She went from op'ra, park, assembly, play,
To morning-walks, and pray'r three hours a-day;

To part her time 'twixt reading and bohea,
To muse, and spill her solitary tea,
Or o'er cold coffee trifle with the spoon,
Count the slow clock, and dine exact at noon;
Divert her eyes with pictures in the fire,
Hum half a tune, tell stories to the 'quire;
Up to her godly garret after seven,
There starve and pray, for that's the way to heav'n.

Some 'quire, perhaps, you take delight to rack;
Whose game is whisky, whose treat's a toast in sack;
Who visits with a gun, presents you birds,
Then gives a smacking buss, and cries,—no words!
Or with his hound comes hollowing from the stable,
Makes love with nods, and knees beneath a table;
Whose laughs are hearty, tho' his jests are coarse,
And loves you best of all things—but his horse.

In some fair ev'ning, on your elbow laid,
You dream of triumphs in the rural shade;
In pensive thought recall the fancy'd scene,
See coronations rise on every green;
Before you pass th' imaginary fights
Of lords and earls, and dukes, and garter'd knights,
While the spread fan o'er-shades your closing eyes;
Then give one flirt, and all the vision flies.
Thus vanish sceptres, coronets and balls,
And leave you in lone woods, or empty walls!

So when your slave, at some dear idle time,
(Not plagu'd with head-achs, or the want of rhyme)
Stands in the streets, abstracted from the crew,
And while he seems to study, thinks of you;
Just when his fancy points your sprightly eyes,
Or sees the blush of soft Parthenia rise,
Gay pats my shoulder, and you vanish quite,
Streets, chairs, and comcocks, rush upon my sight;
Vex'd to be still in town, I knit my brow,
Look sour, and hum a tune, as you may now.

SECT. VII. *Of Descriptive Poetry.*

82. DESCRIPTIVE poetry is of universal use, since there is nothing in nature but what may be described. As poems of this kind, however, are intended more to delight than to instruct, great care should be taken to make them agreeable. Descriptive poems are made beautiful by similes properly induced, images of feigned persons, and allusions to ancient fables or historical facts; as will appear by a perusal of the best of these poems, especially Milton's *L' Allegro* and *Il Penseroso*, Denham's *Cooper Hill*, and Pope's *Windsor Forest*. Every body being in possession of Milton's works, we forbear inserting the two former; and the others are too long for our purpose. That inimitable poem, *The Seasons*, by Mr Thomson, notwithstanding some parts of it are didactic, may be also with propriety referred to this head.

SECT. VIII. *Of Allegorical Poetry.*

83. COULD truth engage the affections of mankind in her native and simple dress, she would require no ornament, or aid, from the imagination; but her delicate light, though lovely in itself, and dear to the most discerning, does not strike the senses of the multitude so as to secure their esteem and attention: the poet therefore dressed her up in the manner in which
they

Allegorical. they thought she would appear the most amiable, and called in allegories and airy disguises as her auxiliaries in the cause of virtue.

An allegory is a fable, or story, in which, under the disguise of imaginary persons or things, some real action or instructive moral is conveyed to the mind. Every allegory therefore has two senses, the one literal and the other mythical; the first has been aptly enough compared to a dream, or vision, of which the last is the true meaning or interpretation.

From this definition of allegorical poetry the reader will perceive that it gives great latitude to genius, and affords such a boundless scope for invention, that the poet is allowed to soar beyond all creation; to give life and action to virtues, vices, passions, diseases, and natural and moral qualities; to raise floating islands, enchanted palaces, castles, &c. and to people them with the creatures of his own imagination.

The poet's eye, in a fine frenzy rolling,
Doth glance from heav'n to earth, from earth to heav'n;
And, as imagination bodies forth
The forms of things unknown, the poet's pen
Turns them to shape, and gives to airy nothing
A local habitation and a name. SHAKESPEARE.

But whatever is thus raised by the magic of his mind must be visionary and typical, and the mythical sense appear obvious to the reader, and inculcate some moral or useful lesson in life; otherwise the whole will be deemed rather the effects of a distempered brain, than the productions of real wit and genius. The poet, like Jason, may fail to parts unexplored, but will meet with no applause if he returns without a golden fleece; for these romantic reveries would be unpardonable but for the mythical meaning and moral that is thus artfully and agreeably conveyed with them, and on which account only the allegory is indulged with a greater liberty than any other sort of writing.

The ancients justly considered this sort of allegory as the most essential part of poetry; for the power of raising images of things not in being, giving them a sort of life and action, and presenting them, as it were, before the eyes, was thought to have something in it like creation: but then, in such compositions, they always expected to find a meaning couched under them of consequence; and we may reasonably conclude, that the allegories of their poets would never have been handed down to us, had they been deficient in this respect.

84. As the *fable* is the part immediately offered to the reader's consideration, and intended as an agreeable vehicle to convey the moral, it ought to be bold, lively, and surprising, that it may excite curiosity and support attention; for if the fable be spiritless and barren of invention, the attention will be disengaged, and the moral, however useful and important in itself, will be little regarded.

There must likewise be a justness and propriety in the fable, that is, it must be closely connected with the subject on which it is employed; for notwithstanding the boundless compals allowed the imagination in these writings, nothing absurd, or useless, is to be introduced. In epic poetry some things may perhaps be admitted for no other reason but to surprize, and to raise what is called the *wonderful*, which is as ne-

cessary to the epic as the *probable*; but in allegories, however wild and extravagant the fable and the persons introduced, each must correspond with the subject they are applied to, and, like the members of a well-written simile, bear a due proportion and relation to each other: for we are to consider, that the allegory is a sort of extended or rather multiplied simile, and therefore, like that, should never lose the subject it is intended to illustrate. Whence it will appear, that genius and fancy are here insufficient without the aid of taste and judgment: these first, indeed, may produce a multitude of ornaments, a wilderness of sweets; but the last must be employed to accommodate them to reason, and to arrange them so as to produce pleasure and profit.

But it is not sufficient that the fable be correspondent with the subject, and have the properties above-described; for it must also be consistent with itself. The poet may invent what story he pleases, and form any imaginary beings that his fancy shall suggest; but here, as in dramatic writings, when persons are once introduced, they must be supported to the end, and all speak and act in character: for notwithstanding the general licence here allowed, some order must be observed; and however wild and extravagant the characters, they should not be absurd. To this let me add, that the whole must be clear and intelligible; for the "fable (as Mr Hughes observes) being designed only to clothe and adorn the moral, but not to hide it, should resemble the draperies we admire in some of the ancient statues, in which the folds are not too many nor too thick, but so judiciously ordered, that the shape and beauty of the limbs may be seen through them."—But this will more obviously appear from a perusal of the best compositions of this class; such as Spenser's *Fairy Queen*, Thomson's *Castle of Indolence*, Addison and Johnson's beautiful allegories in the *Spectator* and *Rambler*, &c. &c.

85. The word *allegory* has been used in a more extensive sense than that in which we have here applied it: for all writings, where the moral is conveyed under the cover of borrowed characters and actions, by which other characters and actions (that are real) are represented, have obtained the name of *allegories*; though the fable or story contains nothing that is visionary or romantic, but is made up of real or historical persons, and of actions either probable or possible. But these writings should undoubtedly be distinguished by some other name, because the literal sense is consistent with right reason, and may convey an useful moral, and satisfy the reader, without putting him under the necessity of seeking for another.

Some of the ancient critics, as Mr Addison observes, were fond of giving the works of their poets this second or concealed meaning, though there was no apparent necessity for the attempt, and often but little show of reason in the application. Thus the *Iliad* and *Odyssey* of Homer are said to be fables of this kind, and that the gods and heroes introduced are only the affections of the mind represented in a visible shape and character. They tell us, says he, that Achilles in the first *Iliad* represents anger, or the irascible part of human nature: that upon drawing his sword against his superior, in a full assembly, Pallas (which, say they, is another name for reason) checks and advises him

Allegorical. him on the occasion, and, at her first appearance, touches him upon the head; that part of the man being looked upon as the seat of reason. In this sense, as Mr Hughes has well observed, the whole *Æneis* of Virgil may be said to be an allegory, if you suppose *Æneas* to represent Augustus Cæsar, and that his conducting the remains of his countrymen from the ruins of Troy, to a new settlement in Italy, is an emblem of Augustus's forming a new government out of the ruins of the aristocracy, and establishing the Romans, after the confusion of the civil war, in a peaceable and flourishing condition. However ingenious this coincidence may appear, and whatever design Virgil had in view, he has avoided a particular and direct application, and so conducted his poem, that it is perfect without any allegorical interpretation; for whether we consider *Æneas* or Augustus as the hero, the morals contained are equally instructive. And indeed it seems absurd to suppose, that because the epic poets have introduced some allegories into their works, every thing is to be understood in a mythical manner, where the sense is plain and evident without any such application. Nor is the attempt that Tasso made to turn his Jerusalem into a mystery, any particular recommendation of the work: for notwithstanding he tells us, in what is called the *allegory*, printed with it, that the Christian army represents man, the city of Jerusalem civil happiness, Godfrey the understanding, Rinaldo and Tancred the other powers of the soul, and that the body is typified by the common soldiers, and the like; yet the reader will find himself as little delighted as edified by the explication: for the mind has little pleasure in an allegory that cannot be opened without a key made by the hand of the same artist; and indeed every allegory that is so dark, and, as it were, inexplicable, loses its very essence, and becomes an enigma, or riddle, that is left to be interpreted by every crude imagination.

This last species of writing, whether called *allegory*, or by any other name, is not less eminent and useful; for the introducing of real or historical persons may not abridge or lessen either our entertainment or instruction. In these compositions we often meet with an uncommon moral conveyed by the fable in a new and entertaining manner; or with a known truth so artfully decorated, and placed in such a new and beautiful light, that we are amazed how any thing so charming and useful should so long have escaped our observation. Such, for example, are many of Johnson's pieces published in the Rambler under the title of *Eastern Stories*, and by Hawkefworth in the *Advertiser*.

The ancient parables are of this species of writing; and it is to be observed, that those in the New Testament have a most remarkable elegance and propriety; and are the more striking, and the more instructive, for being drawn from objects that are familiar.—The more striking, because, as the things are seen, the moral conveyed becomes the object of our senses, and requires little or no reflection;—the more instructive, because every time they are seen, the memory is awakened, and the same moral is again exhibited with pleasure to the mind, and accustoms it to reason and dwell on the subject. So that this method of instruction improves nature, as it were, into a book of life;

since every thing before us may be so managed, as to give lessons for our advantage. Our Saviour's parables of the sower and the seed, of the tares, of the mustard-seed, and of the leaven (Matthew xiii.), are all of this kind, and were obviously taken from the harvest just ripening before him; for his disciples plucked the ears of corn and did eat, rubbing them in their hands. See the articles ALLEGORY, and METAPHOR and Allegory, in the general alphabet.

SECT. VIII. Of Fables.

1. No method of instruction has been more ancient, more universal, and probably none more effectual, than that by apologue or fable. In the first ages, amongst a rude and fierce people, this perhaps was the only method that would have been borne; and even since the progress of learning has furnished other helps, the fable, which at first was used through necessity, is retained from choice, on account of the elegant happiness of its manner, and the refined address with which, when well conducted, it insinuates its moral.

2. As to the actors in this little drama, the fabulist has authority to press into his service every kind of existence under heaven; not only beasts, birds, insects, and all the animal creation; but flowers, shrubs, trees, and all the tribe of vegetables. Even mountains, fossils, minerals, and the inanimate works of nature, discourse articulately at his command, and act the part which he assigns them. The virtues, vices, and every property of beings, receive from him a local habitation and a name. In short, he may personify, bestow life, speech, and action, on whatever he thinks proper.

It is easy to imagine what a source of novelty and variety this must open to a genius capable of conceiving and of employing these ideal persons in a proper manner: what an opportunity it affords him to diversify his images, and to treat the fancy with changes of objects, while he strengthens the understanding, or regulates the passions, by a succession of truths. To raise beings like these into a state of action and intelligence, gives the fabulist an undoubted claim to that first character of the poet, a *creator*.

When these persons are once raised, we must carefully enjoin them proper tasks, and assign them sentiments and language suitable to their several natures and respective properties. A raven should not be extolled for her voice, nor a bear be represented with an elegant shape. It were a very obvious instance of absurdity, to paint a hare cruel, or a wolf compassionate. An ass were but ill qualified to be general of an army, though he may well enough serve, perhaps, for one of the trumpeters. But so long as popular opinion allows to the lion magnanimity, rage to the tiger, strength to the mule, cunning to the fox, and buffoonery to the monkey; why may not they support the characters of an Agamemnon, Achilles, Ajax, Ulysses, and Thersites? The truth is, when moral actions are with judgment attributed to the brute creation, we scarce perceive that nature is at all violated by the fabulist. He appears at most to have only translated their language. His lions, wolves, and foxes, behave and argue as those creatures would, had they originally been endowed with the human faculties of speech and reason.

But greater art is yet required whenever we perform inanimate beings. Here the copy so far deviates from the great lines of nature, that, without the nicest care, reason will revolt against the fiction. However, beings of this sort, managed ingeniously and with address, recommend the fabulist's invention by the grace of novelty and of variety. Indeed the analogy between things natural and artificial, animate and inanimate, is often so very striking, that we can, with seeming propriety, give passions and sentiments to every individual part of existence. Appearance favours the deception. The vine may be enamoured of the elm; her embraces testify her passion. The swelling mountain may, naturally enough, be delivered of a mouse. The gourd may reproach the pine, and the sky-rocket insult the stars. The axe may solicit a new handle of the forest; and the moon, in her female character, request a fashionable garment. Here is nothing incongruous; nothing that shocks the reader with impropriety. On the other hand, were the axe to desire a periwig, and the moon petition for a new pair of boots, probability would then be violated, and the absurdity become too glaring.

3. The most beautiful fables that ever were invented, may be disfigured by the language in which they are clothed. Of this poor *Æop*, in some of his English dresses, affords a melancholy proof. The ordinary style of fable should be familiar, but also elegant.

The familiar, says Mr La Motte, is the general tone or accent of fable. It was thought sufficient, on its first appearance, to lend the animals our most common language. Nor indeed have they any extraordinary pretensions to the sublime; it being requisite they should speak with the same simplicity that they behave.

The familiar also is more proper for insinuation than the elevated; this being the language of reflection, as the former is the voice of sentiment. We guard ourselves against the one, but lie open to the other; and instruction will always the most effectually sway us, when it appears least jealous of its rights and privileges.

The familiar style, however, that is here required, notwithstanding that appearance of ease which is its character, is perhaps more difficult to write than the more elevated or sublime. A writer more readily perceives when he has risen above the common language, than he perceives, in speaking this language, whether he has made the choice that is most suitable to the occasion: and it is, nevertheless, upon this happy choice depends all the charms of the familiar. Moreover, the elevated style deceives and seduces, although it be not the best chosen; whereas the familiar can procure itself no sort of respect, if it be not easy, natural, just, delicate, and unaffected. A fabulist must therefore bestow great attention upon his style; and even labour it so much the more, that it may appear to have cost him no pains at all.

The authority of Fontaine justifies these opinions in regard to style. His fables are perhaps the best examples of the genteel familiar, as Sir Roger L'Estrange affords the grossest of the indelicate and low. When we read, that "while the frog and the mouse were disputing it at sword's-point, down comes a kite powdering upon them in the interim, and gobble up both

together to part the fray." And "where the fox reproaches a bevy of jolly gossiping wenches making merry over a dish of pullets, that if he but peeped into a hen-roost, they always made a bawling with their dogs and their bairds; while you yourselves (says he) can lie stuffing your guts with your hens and capons, and not a word of the pudding." This may be familiar; but it is also coarse and vulgar, and cannot fail to disgust a reader that has the least degree of taste or delicacy.

The style of fable then must be simple and familiar; and it must likewise be correct and elegant. By the former, we mean, that it should not be loaded with figure and metaphor; that the disposition of words be natural, the turn of sentences easy, and their construction unembarrassed. By elegance, we would exclude all coarse and provincial terms; all affected and peurile conceits; all obsolete and pedantic phrases. To this we would adjoin, as the word perhaps implies, a certain finishing polish, which gives a grace and spirit to the whole; and which, though it have always the appearance of nature, is almost ever the effect of art.

But notwithstanding all that has been said, there are some occasions on which it is allowable, and even expedient, to change the style. The language of a fable must rise or fall in conformity to the subject. A lion, when introduced in his regal capacity, must hold discourse in a strain somewhat more elevated than a country-mouse. The lioness then becomes his queen, and the beasts of the forest are called his subjects: a method that offers at once to the imagination both the animal and the person he is designed to represent. Again, the buffoon-monkey should avoid that pomp of phrase, which the owl employs as her best pretence to wisdom. Unless the style be thus judiciously varied, it will be impossible to preserve a just distinction of character.

Descriptions, at once concise and pertinent, add a grace to fable; but are then most happy when included in the action: whereof the fable of Boreas and the Sun affords us an example. An epithet well chosen is often a description in itself; and so much the more agreeable, as it the less retards us in our pursuit of the catastrophe.

Lastly, little strokes of humour when arising naturally from the subject, and incidental reflections when kept in due subordination to the principal, add a value to these compositions. These latter, however, should be employed very sparingly, and with great address; be very few, and very short: it is scarcely enough that they naturally spring out of the subject; they should be such as to appear necessary and essential parts of the fable. And when these embellishments, pleasing in themselves, tend to illustrate the main action, they then afford that nameless grace remarkable in Fontaine and some few others, and which persons of the best discernment will more easily conceive than they can explain.

SECT. IX. Of Satire.

88. THIS kind of poem is of very ancient date, and (if we believe Horace) was introduced, by way of interlude, by the Greek dramatic poets in their tragedies, to relieve the audience, and take off the force

Satire.

force of those strokes which they thought too deep and affecting. In those satirical interludes, the scene was laid in the country; and the persons were rural deities, satyrs, country peasants, and other rustics.

The first Tragedians found that serious style Too grave for their uncultivated age,
And so brought wild and naked Satyrs in,
(Whole motion, words, and shape, were all a farce)
As oft as decency wou'd give them leave;
Because the mad, ungovernable rout,
Full of confusion and the fumes of wine,
Lov'd such variety and antic tricks.

Roscommon's *Horace*.

The satire we now have is generally allowed to be of Roman invention. It was first introduced without the decorations of scenes and action; but written in verses of different measures by Ennius, and afterwards moulded into the form we now have it by Lucilius, whom Horace has imitated, and mentions with esteem. This is the opinion of most of the critics, and particularly of Boileau, who says,

Lucilius led the way, and, bravely bold,
To Roman vices did the mirror hold;
Protected humble goodness from reproach,
Show'd worth on foot, and rascals in a coach.
Horace his pleasing wit to this did add,
That none, unenjur'd, might be fools or mad:
And Juvenal, with rhetorician's rage,
Scourg'd the rank vices of a wicked age;
'Tho' horrid truths thro' all his labours shine,
In what he writes there's something of divine.

89. Our satire, therefore, may be distinguished into two kinds; the *jocose*, or that which makes sport with vice and folly, and sets them up to ridicule; and the *serious*, or that which deals in asperity, and is severe and acrimonious. Horace is a perfect master of the first, and Juvenal much admired for the last. The one is facetious, and smiles: the other is angry, and storms. The foibles of mankind are the object of one; but crimes of a deeper dye have engaged the other. They both agree, however, in being pungent and biting: and from a due consideration of the writings of these authors, who are our masters in this art, we may define satire to be, A free, (and often *jocose*), witty, and sharp poem, wherein the follies and vices of men are lashed and ridiculed in order to their reformation. Its subject is whatever deserves our contempt or abhorrence, (including every thing that is ridiculous and absurd, or scandalous and repugnant to the golden precepts of religion and virtue.) Its manner is *invective*; and its end, *shame*. So that satire may be looked upon as the physician of a diseased mind, which it endeavours to cure by bitter and unfavoury, or by pleasant and salutary applications.

90. A good satirist ought to be a man of wit and address, sagacity and eloquence. He should also have a great deal of good-nature, as all the sentiments which are beautiful in this way of writing must proceed from that quality in the author. It is good-nature produces that disdain of all baseness, vice, and folly, which prompts the poet to express himself with such smartness against the errors of men, but without bitterness to their persons. It is this quality that keeps

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the mind even; and never lets an offence unreasonably throw the satirist out of his character.

61. In writing satire, care should be taken that it be true and general; that is, levelled at abuses in which numbers are concerned: for the personal kind of satire, or lampoon, which exposes particular characters, and affects the reputation of those at whom it is pointed, is scarce to be distinguished from scandal and defamation. The poet also, whilst he is endeavouring to correct the guilty, must take care not to use such expressions as may corrupt the innocent: he must therefore avoid all obscene words, and images that tend to debase and mislead the mind. Horace and Juvenal, the chief satirists among the Romans, are faulty in this respect, and ought to be read with caution.

92. The style proper for satire is sometimes grave and animated, inveighing against vice with warmth and earnestness; but that which is pleasant, sportive, and, with becoming railery, bansters men out of their bad dispositions, has generally the best effect, as it seems only to play with their follies, though it omits no opportunity of making them feel the lash. The verses should be smooth and flowing, and the language manly, just, and decent.

Of well-chose words some take not care enough,
And think they should be as the subject rough:
But satire must be more exactly made,
And sharpest thoughts in smoothest words convey'd.

Duke of Buck's *Essay*.

93. Satires, either of the *jocose* or *serious* kind, may be written in the epistolary manner, or by way of dialogue. Horace, Juvenal, and Persius, have given us examples of both. Nay, some of Horace's satires may, without incongruity, be called *epistles*, and his epistles *satires*. But this is obvious to every reader.

Of the facetious kind, the second satire of the second book of Horace imitated by Mr Pope, and Swift's verses on his own death, may be referred to as examples.

As to those satires of the serious kind, for which Juvenal is so much distinguished, the characteristic properties of which are, morality, dignity, and severity; a better example cannot be mentioned than a poem entitled *London*, written in imitation of the third satire of Juvenal, by Mr Samuel Johnson, who has kept up to the spirit and force of the original.

Nor must we omit to mention Dr Young's *Love of Fame the Universal Passion*, in seven satires; which, though characteristical, abound with morality and good sense. The characters are well selected, the ridicule is high, and the satire well pointed and to the purpose.

94. We have already observed, that personal satire approaches too near defamation, to deserve any countenance or encouragement. Dryden's *Mack Flecknoe* is for this reason exceptionable, but as a composition it is inimitable.

We have dwelt thus long on the present subject, because there is reason to apprehend, that the benefits arising from well-conducted satire have not been sufficiently considered. A satire may often do more service to the cause of religion and virtue, than a sermon; since it gives pleasure, at the same time that it creates

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fear or indignation, and conveys its sentiments in a manner the most likely to captivate the mind.

Of all the ways that wisest men could find
To mend the age and mortify mankind,
Satire well writ has most successful prov'd,
And cures, because the remedy is lov'd.

Duke of Bucks's Essay.

But to produce the desired effect, it must be jocose, free, and impartial, though severe. The satirist should always preserve good-humour; and, however keen he cuts, should cut with kindness. When he loses temper, his weapons will be inverted, and the ridicule he threw at others will retort with contempt upon himself; for the reader will perceive that he is angry and hurt, and consider his satire as the effect of malice, not of judgment; and that it is intended rather to wound serious, than reform manners.

Rage you must hide, and prejudice lay down:
A satyr's smile is sharper than his frown.

The best, and indeed the only method to expose vice and folly effectually, is to turn them to ridicule, and hold them up for public contempt; and as it most offends these objects of satire, so it least hurts ourselves. One passion frequently drives out another; and as we cannot look with indifference on the bad actions of men (for they must excite either our wrath or contempt), it is prudent to give way to that which most offends vice and folly, and least affects ourselves; and to sneer and laugh, rather than be angry and scold.

95. Burlesque poetry, which is chiefly used by way of drollery and ridicule, falls properly to be spoken of under the head of satire. An excellent example of this kind is a poem in blank verse, intitled *The Splendid Shilling*, written by Mr John Phillips, which, in the opinion of one of the best judges of the age, is the finest burlesque in the English language. In this poem the author has handled a low subject in the lofty style and numbers of Milton; in which way of writing Mr Phillips has been imitated by several, but none have come up to the humour and happy turn of the original. When we read it, we are betrayed into a pleasure that we could not expect; though, at the same time, the sublimity of the style, and gravity of the phrase, seem to chastise that laughter which they provoke.

96. There is another sort of verse and style, which is most frequently made use of in treating any subject in a ludicrous manner, viz. that which is generally called *Hudibrastic*, from Butler's admirable poem intitled *Hudibras*. Almost every one knows, that this poem is a satire upon the authors of our civil dissensions in the reign of king Charles I. wherein the poet has, with abundance of wit and humour, exposed and ridiculed the hypocrisy or blind zeal of those unhappy times. In short, it is a kind of burlesque epic poem, which, for the oddity of the rhymes, the quaintness of the similes, the novelty of the thoughts, and that fine raillery which runs through the whole performance, is not to be paralleled.

SECT. X. Of the Epigram.

97. The epigram is a little poem, or composition in verse, treating of one thing only, and whose distinguishing characters are brevity, beauty, and point.

The word *epigram* signifies "inscription;" for epigrams derive their origin from those inscriptions placed by the ancients on their statues, temples, pillars, triumphal arches, and the like; which, at first, were very short, being sometimes no more than a single word; but afterwards, increasing their length, they made them in verse, to be the better retained by the memory. This short way of writing came at last to be used upon any occasion or subject; and hence the name of *epigram* has been given to any little copy of verses, without regard to the original application of such poems.

Its usual limits are from 2 to 20 verses, though sometimes it extends to 50; but the shorter, the better it is, and the more perfect, as it partakes more of the nature and character of this kind of poem: besides, the epigram, being only a single thought, ought to be expressed in a little compass, or else it loses its force and strength.

The beauty required in an epigram is an harmony and apt agreement of all its parts, a sweet simplicity, and polite language.

The point is a sharp, lively, unexpected turn of wit, with which an epigram ought to be concluded. There are some critics, indeed, who will not admit the point in an epigram; but require that the thought be equally diffused through the whole poem, which is usually the practice of Catullus, as the former is that of Martial. It is allowed there is more delicacy in the manner of Catullus; but the point is more agreeable to the general taste, and seems to be the chief characteristic of the epigram.

This sort of poem admits of all manner of subjects, provided that brevity, beauty, and point are preferred; but it is generally employed either in praise or satire.

Though the best epigrams are said to be such as are comprised in two or four verses, we are not to understand it as if none can be perfect which exceed those limits. Neither the ancients nor moderns have been so scrupulous with respect to the length of their epigrams; but however, brevity in general is always to be studied in these compositions.

For examples of good epigrams in the English language, we shall make choice of several in the different tastes we have mentioned; some remarkable for their delicate turn and simplicity of expression; and others for their salt and sharpness, their equivocating pun, or pleasant allusion. In the first place, take that of Mr Pope, said to be written on a glass with the earl of Chesterfield's diamond-pencil.

Accept a miracle, instead of wit;

See two dull lines by Stanhope's pencil writ.

The beauty of this epigram is more easily seen than described; and it is difficult to determine, whether it does more honour to the poet who wrote it, or to the nobleman for whom the compliment is designed.—The following epigram of Mr Prior is written in the same taste, being a fine encomium on the performance of an excellent painter.

On a Flower, painted by VARELST.

When sam'd Varelst this little wonder drew,
Flora vouchsaf'd the growing work to view:

Finding

Finding the painter's science at a stand,
The Goddess snatch'd the pencil from his hand,
And, finishing the piece, the smiling said,
Behold one work of mine which ne'er shall fade.

Another compliment of this delicate kind he has made Mr Howard in the following epigram.

V E N U S *Mistaken.*

When Chloe's picture was to Venus shown;
Surpriz'd, the Goddess took it for her own.
And what, said she, does this bold painter mean?
When was I bathing thus, and naked seen?
Pless'd Cupid heard, and check'd his mother's pride:
And who's blind now, mamma? the urchin cry'd.
'Tis Chloe's eye, and cheek, and lip, and breast:
Friend Howard's genius fancy'd all the rest.

Most of Mr Prior's epigrams are of this delicate cast, and have the thought, like those of Catullus, diffused through the whole. Of this kind is his address

T O C H L O E *Weeping.*

See, whilst thou weep'st, fair Chloe, see
The world in sympathy with thee.
The cheerful birds no longer sing,
Each drops his head, and hangs his wing.
The clouds have bent their bosom lower,
And shed their sorrow in a shower.
The brooks beyond their limits flow,
And louder murmurs speak their woe:
The nymphs and swains adopt thy cares;
They heave thy sighs, and weep thy tears.
Fantastic nymph! that grief should move
Thy heart obdurate against love.
Strange tears! whose pow'r can soften all,
But that dear breath on which they fall.

The epigram written on the leaves of a fan by Dr Atterbury, late bishop of Rochester, contains a pretty thought, expressed with ease and conciseness, and closed in a beautiful manner.

O n a F A N.

Flavia the least and slightest toy
Can with restless art employ.
This fan in meaner hands would prove
An engine of small force in love:
Yet she, with graceful air and mien,
Not to be told or safely seen,
Directs its wanton motion so,
That it wounds more than Cupid's bow,
Gives coolness to the matchless dame,
To ev'ry other breath a flame.

We shall now select some epigrams of the biting and satirical kind, and such as turn upon the *pun* or *equivoque*, as the French call it: in which sort the point is more conspicuous than in those of the former character.

The following distich is an admirable epigram, having all the necessary qualities of one, especially point and brevity.

On a Company of bad DANCERS to good Music.
How ill the motion with the music suits!
So Orpheus fiddled, and so danc'd the brutes.

This brings to mind another epigram upon a bad fiddler, which we shall venture to insert merely for the humour of it, and not for any real excellence it contains.

T o a B a d F I D D L E R.

Old Orpheus play'd so well, he mov'd Old Nick;
But thou mov'st nothing but thy fiddle-stick.

One of Martial's epigrams, wherein he agreeably rallies the foolish vanity of a man who hired people to make verses for him, and published them as his own, has been thus translated into English:

Paul so fond of the name of a poet is grown,
With gold he buys verses, and calls them his own.
Go on, master Paul, nor mind what the world says,
They are surely his own for which a man pays.

Some bad writer having taken the liberty to censure Mr Prior, the poet very wittily lashed his impertinence in this epigram:

While faster than his costly brain indites,
Philo's quick hand in flowing letters writes,
His case appears to me like honest Teague's,
When he was run away with by his legs.
Phœbus, give Philo o'er himself command;
Quicken his senses, or restrain his hand:
Let him be kept from paper, pen, and ink;
So he may cease to write, and learn to think.

Mr Wesley has given us a pretty epigram, alluding to a well-known text of scripture, on the setting up a monument in Westminster Abbey, to the memory of the ingenious Mr Butler, author of *Hudibras*.

While Butler, needy wretch, was yet alive,
No generous patron would a dinner give.
See him when starv'd to death, and turn'd to dust,
Presented with a monumental bust!
The poet's fate is here in emblem shown;
He ask'd for *Bread*, and he receiv'd a *Stone*.

We shall close this section with an epigram written on the well-known story of Apollo and Daphne, by Mr Smart.

When Phœbus was am'rous and long'd to be rude,
Mils Daphne cry'd Pish! and ran swift to the wood;
And rather than do such a naughty affair,
She became a fine laurel to deck the god's hair.
The nymph was, no doubt, of a cold constitution;
For, sure, to turn tree was an odd resolution!
Yet in this she behav'd like a true modern spruce,
For she fled from his arms to distinguish his brows.

S E C T. XI. *Of the Epitaph.*

102. THESE compositions generally contain some eulogium of the virtues and good qualities of the deceased, and have a turn of seriousness and gravity adapted to the nature of the subject. Their elegance consists in a nervous and expressive brevity; and sometimes they are closed with an epigrammatic point. In these compositions, no mere epithet (properly so called) should be admitted; for here illustration would impair the strength, and render the sentiment too diffuse and languid. Words that are synonymous are also to be rejected.

Though the true characteristic of the epitaph is seriousness and gravity, yet we may find many that are jocose and ludicrous: some likewise have true metre and rhyme; while others are from prose and verse, without any certain measure, though the words are truly poetical; and the beauty of this last sort is generally heightened by an apt and judicious antithesis. We shall give examples of each.

The following epitaph on Sir Philip Sidney's sister, the countess of Pembroke, said to be written by the famous Ben Jonson, is remarkable for the noble thought with which it concludes.

On MARY countess dowager of PEMBROKE,

Underneath this noble marble hearse,
Lies the subject of all verse,
Sidney's sister, Pembroke's mother:
Death, ere thou hast kill'd another
Fair, and learn'd, and good as she,
Time shall throw a dart at thee.

Take another epitaph of Ben Jonson's, on a beautiful and virtuous lady, which has been deservedly admired by very good judges.

Underneath this stone doth lie
As much virtue as could die;
Which when alive did vigour give
To as much beauty as could live.

Mr Pope has drawn the character of Mr Gay, in an epitaph now to be seen on his monument in Westminster-abbey, which he has closed with a most beautiful turn, and is looked upon as a master-piece of its kind, as indeed are most of the productions of that surprising genius.

On Mr GAY.

Of manners gentle, of affections mild;
In wit, a man; simplicity, a child;
With native humour temp'ring virtuous rage,
Form'd to delight at once, and last the age:
Above temptation in a low estate,
And uncorrupted ev'n among the great:
A safe companion, and an easy friend,
Unblam'd thro' life, lamented in thy end.
These are thy honours! not that here thy bust
Is mix'd with heroes, or with kings thy dust;
But that the worthy and the good shall say,
Striking their pensive bosoms—Here lies GAY.

Amongst the epitaphs of a punning and ludicrous cast, we know of none prettier than that which is said to have been written by Mr Prior on himself, wherein he is pleasantly satirical upon the folly of those who value themselves on account of the long series of ancestors through which they can trace their pedigree.

Nobles and heralds, by your leave,
Here lies the bones of Matthew Prior,
The son of Adam and of Eve:
Let Bourbon or Nassau go higher.

The following epitaph on a miser contains a good caution and an agreeable railery.

Reader, beware immoderate love of pelf:
Here lies the worst of thieves, who robb'd himself.

But Dr Swift's epitaph on the same subject is a master-piece of the kind.

Beneath this verdant hillock lies
Demer, the wealthy and the wise,
His heirs, that he might safely rest,
Have put his carcass in a chest:
The very chest, in which, they say,
His other Self, his money, lay.
And if his heirs continue kind
To that dear self he left behind,
I dare believe that four in five
Will think his better half alive.

We shall give but one example more of this kind, which is a merry epitaph on an old fiddler, who was remarkable (we may suppose) for beating time to his own music.

On STEPHEN the Fiddler.

Stephen and time are now both even;
Stephen beat time, now time's beat Stephen.

We are come now to that sort of epitaph which rejects rhyme, and has no certain and determinate measure; but where the diction must be pure and strong, every word have weight, and the antithesis be preferred in a clear and direct opposition. We cannot give a better example of this sort of epitaph, than that on the tomb of Mr Pultney in the cloisters of Westminster-abbey.

Reader,

If thou art a BRITON,
Behold this Tomb with Reverence and Regret:
Here lies the Remains of

DANIEL PULTENEY,

The kindest Relation, the truest Friend,
The warmest Patriot, the worthiest Man.
He exercis'd Virtues in this Age,
Sufficient to have distinguish'd him even in the best.
Sagacious by Nature,
Industrious by Habit,
Inquisitive with Art;
He gain'd a complete Knowledge of the State of Britain,
Foreign and domestic;
In most the backward Fruit of tedious Experience,
In him the early acquisition of undissipated Youth.
He serv'd the Court several Years:
Abroad, in the auspicious Reign of Queen Anne;
At home, in the reign of that excellent prince K. George I.

He serv'd his Country always,

At Court independent,

In the Senate unbias'd,

At every Age, and in every Station:
This was the bent of his generous Soul,
This the business of his laborious Life.

Public Men, and Public Things,
He judg'd by one constant Standard,

The true Interest of Britain:

He made no other Distinction of Party,

He abhorred all other.

Gentle, humane, disinterested, beneficent,
He created no Enemies on his own Account:

Firm, determin'd, inflexible,

He feared none he could create in the Cause of Britain.

Reader,

Epitaph.

Epitaph.

Reader,
In this Misfortune of thy Country lament thy own:
For know,
The Loss of so much private Virtue
Is a public Calamity.

That poignant satire, as well as extravagant praise,
may be conveyed in this manner, will be seen by the
following epitaph written by Dr Arbuthnot on Francis
Chartres; which is too well known, and too much
admired, to need our commendation.

HERE continueth to rot
The Body of FRANCIS CHARTRES,
Who with an INFLEXIBLE CONSTANCY,
And INIMITABLE UNIFORMITY of Life,
PERSISTED,

In spite of AGE and INFIRMITIES,
In the Practice of EVERY HUMAN VICE,
Excepting PRODIGALITY and HYPOCRISY:
His insatiable AVARICE exempted him from the first,
His matchless IMPUDENCE from the second.

Nor was he more singular
In the undeviating *Pravity* of his *Manners*,
Than successful

In *Accumulating WEALTH*:
For, without TRADE or PROFESSION,
Without TRUST of PUBLIC MONEY,
And without BRIBE-WORTHY Service,
He acquired, or more properly created,
A MINISTERIAL ESTATE.

He was the only Person of his Time
Who could cheat without the Mask of HONESTY,
Retain his Primæval MEANNESS

When possessed of TEN THOUSAND a-year;
And having daily deserved the GIBNET for what he *did*,
Was at last condemn'd to it for what he *could not do*.

Oh indignant reader!

Think not his Life useless to Mankind;
PROVIDENCE conniv'd at his execrable designs,
To give to After-ages

A conspicuous PROOF and EXAMPLE,
Of how small Estimation is EXORBITANT WEALTH

In the Sight of GOD,
By His bestowing it on the most UNWORTHY of ALL
MORTALS.

We shall conclude this species of poetry with a droll
and satirical epitaph written by Mr Pope, which we
transcribed from a monument in Lord Cobham's gar-
dens at Stow in Buckinghamshire.

To the Memory
of

SIGNIOR FIDO,
An *Italian* of good extraction;
Who came into *England*,
Not to bite us, like most of his Countrymen,
But to gain an honest Livelyhood.

He hunted not after Fame,
Yet acquir'd it;
Regardless of the Praise of his Friends,
but most sensible of their Love.
Tho' he liv'd amongst the Great,
He neither learnt nor flatter'd any Vice.

He was no Bigot,
Tho' he doubted of none of the 39 Articles.

And, if to follow Nature,
and to respect the Laws of Society,
be Philosophy,

he was a perfect Philosopher,
a faithful Friend,
an agreeable Companion,
a loving Husband,

distinguish'd by a numerous offspring,
all which he liv'd to see take good Courses.

In his old Age he retired
to the house of a clergyman in the country,
where he finish'd his earthly Race,
and died an Honour and an Example to the whole Species.

Reader,

This Stone is guiltless of Flattery;
for he to whom it is inscrib'd
was not a MAN,

but a
GRE-HOUND.

PART III. ON VERSIFICATION.

ON this subject it is meant to confine our inquiry to
Latin or Greek hexameters, and to French and
English heroic verse; as the observations we shall have
occasion to make, may, with proper variations, be
easily transferred to the composition of other sorts of
verse.

Before entering upon particulars, it must be pre-
mised in general, that to verse of every kind, five
things are of importance. 1st, The number of syllables
that compose a line. 2d, The different lengths of
syllables, *i. e.* the difference of time taken in pro-
nouncing. 3d, The arrangement of these syllables
combined in words. 4th, The pauses or stops in
pronouncing. 5th, Pronouncing syllables in a high
or a low tone. The three first mentioned are ob-
viously essential to verse; if any of them be wanting,
there cannot be that higher degree of melody which
distinguisheth verse from prose. To give a just notion
of the fourth, it must be observed, that pauses are

necessary for three different purposes: one, to sepa-
rate periods, and members of the same period, accord-
ing to the sense: another, to improve the melody of
verse: and the last, to afford opportunity for drawing
breath in reading. A pause of the first kind is vari-
able, being long or short, frequent or less frequent,
as the sense requires. A pause of the second kind,
being determined by the melody, is in no degree ar-
bitrary. The last sort is in a measure arbitrary, de-
pending on the reader's command of breath. But as
one cannot read with grace, unless, for drawing breath,
opportunity be taken of a pause in the sense or in the
melody, this pause ought never to be distinguished
from the others; and for that reason shall be laid aside.
With respect then to the pauses of sense and of melody,
it may be affirmed without hesitation, that their coin-
cidence in verse is a capital beauty: but as it cannot
be expected, in a long work especially, that every
line should be so perfect; we shall afterward have
occasion

occasion to see, that the pause necessary for the sense must often, in some degree, be sacrificed to the verse-pause, and the latter sometimes to the former.

The pronouncing syllables in a high or low tone, contributes also to melody. In reading, whether verse or prose, a certain tone is assumed, which may be called the *key-note*; and in that tone the bulk of the words are founded. Sometimes to humour the sense, and sometimes the melody, a particular syllable is founded in a higher tone; and this is termed *accenting a syllable*, or gracing it with an accent. Opposed to the accent, is the cadence, which, however, being entirely regulated by the sense, hath no peculiar relation to verse. The cadence is a falling of the voice below the key-note at the close of every period; and so little is it essential to verse, that in correct reading the final syllable of every line is accented, that syllable only excepted which closes the period where the sense requires a cadence.

Though the five requisites above mentioned enter the composition of every species of verse, they are however governed by different rules, peculiar to each species. Upon quantity only, one general observation may be premised, because it is applicable to every species of verse, That syllables, with respect to the time taken in pronouncing, are long or short; two short syllables, with respect to time, being precisely equal to a long one. These two lengths are essential to verse of all kinds; and to no verse, it is believed, is a greater variety of time necessary in pronouncing syllables. The voice indeed is frequently made to rest longer than usual upon a word that bears an important signification; but this is done to humour the sense, and is not necessary for melody. A thing not more necessary for melody occurs with respect to accenting, similar to that now mentioned: A word signifying any thing humble, low, or dejected, is naturally, in prose as well as in verse, pronounced in a tone below the key-note.

We are now sufficiently prepared for particulars; beginning with Latin or Greek hexameter, which are the same. The observations upon this species of verse, will come under the four following heads, number, arrangement, pause, and accent; for as to quantity, what is observed above may suffice.

I. Hexameter lines, as to time, are all of the same length; being equivalent to the time taken in pronouncing twelve long syllables or twenty-four short. An hexameter line may consist of seventeen syllables: and when regular and not Spondaic, it never has fewer than thirteen: whence it follows, that where the syllables are many, the plurality must be short; where few, the plurality must be long.

This line is susceptible of much variety as to the succession of long and short syllables. It is however subjected to laws that confine its variety within certain limits: and for ascertaining these limits, grammarians have invented a rule by dactyles and spondaes, which they denominate *feet*. One at first view is led to think, that these feet are also intended to regulate the pronunciation: which is far from being the case; for were one to pronounce according to these feet, the melody of a hexameter line would be destroyed, or at best be much inferior to which it is when properly pronounced. These feet must be confined to regulate the

arrangement, for they serve no other purpose. They are withal extremely artificial and complex; for which reason we are obliged to lord Kames for substituting in their stead the following rules more simple and of more easy application. 1st, The line must always commence with a long syllable, and close with two long preceded by two short. 2d, More than two short can never be found together, nor fewer than two. And, 3d, Two long syllables which have been preceded by two short, cannot also be followed by two short. These few rules fulfil all the conditions of a hexameter line with relation to order or arrangement. To these again a single rule may be substituted, which has also the advantage of regulating more affirmatively the construction of every part. To put this rule into words with perspicuity, a hint is taken from the twelve long syllables that compose an hexameter line, to divide it into twelve equal parts or portions, being each of them one long syllable or two short. The rule then is: "The 1st, 3d, 5th, 7th, 9th, 11th, and 12th portions, must each of them be one long syllable; the 10th must always be two short syllables; the 2d, 4th, 6th, and 8th, may either be one long or two short." Or to express the thing still more curtly, "The 2d, 4th, 6th, and 8th portions may be one long syllable or two short; the 10th must be two short syllables; all the rest must consist each of one long syllable." This fulfils all the conditions of an hexameter line, and comprehends all the combinations of dactyles and spondaes that this line admits.

Next in order comes the pause. At the end of every hexameter line, every one must be sensible of a complete close or full pause; the cause of which follows. The two long syllables preceded by two short, which always close an hexameter line, are a fine preparation for a pause: for long syllables, or syllables pronounced slow, resembling a slow and languid motion tending to rest, naturally incline the mind to rest, or, which is the same, to pause; and to this inclination the two preceding short syllables contribute, which, by contrast, make the slow pronunciation of the final syllables the more conspicuous. Beside this complete close or full pause at the end, others are also requisite for the sake of melody: of which, two are clearly discoverable; and perhaps there may be more. The longest and most remarkable, succeeds the 5th portion: the other, which, being shorter and more faint, may be called the *semipause*, succeeds the 8th portion. So striking is the pause first mentioned, as to be distinguished even by the rudest ear: the monkish rhymes are evidently built upon it; in which, by an invariable rule, the final word always chimes with that which immediately precedes the pause:

De planctu cudo || metrum cum carmine nudo
Mingere cum bumbis || res est saluberrima lumbis.

The difference of time in the pause and semipause, occasions another difference not less remarkable; that it is lawful to divide a word by a semipause, but never by a pause, the bad effect of which is sensibly felt following examples:

Effusus labor, at||que inimitis rupta Tyranni
Again:

Observans nido im||plumes detraxit; at illa

Again:

Verifica-
tion.

Elem. of
Criticism,
ch. xviii.
sect. 4.

Verifica-
tion.

Again,
Loricam quam De||moleo detraxerat ipse

The dividing a word by a semipaſſe has not the fame bad effect:

Jamque pedem referens || caſus e | vaſerat omnes.

Again:

Qualis populea || mœrens Philo|mela ſub umbra.

Again:

Ludere que vellem || calamo per | miſit agreſſi.

Lines, however, where words are left entire, without being divided even by a ſemipaſſe, run by that means much the more ſweetly.

Nec gemere aërea || ceſſabit | turtur ab ulmo.

Again:

Quadrupedante putrem||ſonitu quatit ungula campum.

Again:

Eurydicen toto || reſerebant | flumine ripæ.

The reaſon of theſe obſervations will be evident upon the ſlighteſt reflection. Between things ſo intimately connected in reading aloud, as are ſenſe and ſound, every degree of diſcord is unpleaſant; and for that reaſon, it is a matter of importance, to make the muſical pauses coincide as much as poſſible with thoſe of ſenſe; which is requiſite, more eſpecially, with reſpect to the pause, a deviation from the rule being leſs remarkable in a ſemipaſſe. Conſidering the matter as to melody ſoldy, it is indifferent whether the pauses be at the end of words or in the middle; but when we carry the ſenſe along, it is diſagreeable to find a word ſplit into two by a pause, as if there were really two words; and though the diſagreeableneſs here be connected with the ſenſe only, it is by an eaſy tranſition of perceptions tranſferred to the ſound; by which means we conceive a line to be harſh and grating to the ear, when in reality it is only ſo to the underſtanding.

To the rule that fixes the pause after the 5th portion, there is one exception, and no more. If the ſyllable ſucceeding the 5th portion be ſhort, the pause is ſometimes poſtpoſed to it:

Pupillis quos dura || premit cuſtodia matrum

Again:

In terras oppreſſa || gravi ſub religione

Again:

Et quorum pars magna || fui; quis talia fando

This contributes to diverſify the melody; and, where the words are ſmooth and liquid, is not ungraceful; as in the following examples:

Formoſam reſonare || doces Amarylida ſylvas

Again:

Agricolæ, quibus ipſa || procul diſcordibus armis

If this pause, placed as aforeſaid after the ſhort ſyllable, happen alſo to divide a word, the melody by theſe circumſtances is totally annihilated. Witneſs the following line of Ennius, which is plain proſe:

Romæ mœnia terru||it impiger | Hannibal armis.

Hitherto the arrangement of the long and ſhort ſyllables of an hexameter line and its different pauses, have been conſidered with reſpect to melody: but to have a juſt notion of hexameter verſe, theſe particulars muſt alſo be conſidered with reſpect to ſenſe. There is

not, perhaps, in any other ſort of verſe, ſuch latitude in the long and ſhort ſyllables; a circumſtance that contributes greatly to that richneſs of melody which is remarkable in hexameter verſe, and which made Ariſtotle pronounce, that an epic poem in any other verſe would not ſucceed *. One defect, however, * *Poet. cap. 25.* muſt not be diſſembled, that the ſame means which contribute to the richneſs of the melody, render it leſs fit than ſeveral other ſorts for a narrative poem. There cannot be a more artful contrivance, as above obſerved, than to cloſe an hexameter line with two long ſyllables preceded by two ſhort: but unhappily this conſtruction proves a great embarraſſment to the ſenſe; which will thus be evident. As, in general, there ought to be a ſtrict concordance between the thought and the words in which it is dreſſed; ſo, in particular, every cloſe in the ſenſe ought to be accompanied with a cloſe in the ſound. In proſe, this law may be ſtrictly obſerved; but in verſe, the ſame ſtrictneſs would occaſion inſuperable difficulties. Willing to ſacrifice to the melody of verſe, ſome ſhare of the concordance between thought and expreſſion, we freely excuſe the ſeparation of the muſical pause from that of the ſenſe, during the courſe of a line; but the cloſe of an hexameter line is too conſpicuous to admit this liberty: for which reaſon there ought always to be ſome pause in the ſenſe at the end of every hexameter line, were it but ſuch a pause as is marked by a comma; and for the ſame reaſon, there ought never to be a full cloſe in the ſenſe but at the end of a line, becauſe there the melody is cloſed. An hexameter line, to preſerve its melody, cannot well admit any greater relaxation; and yet, in a narrative poem, it is extremely difficult to adhere ſtrictly to the rule even with theſe indulgences. Virgil, the chief of poets for verification, is forced often to end a line without any cloſe in the ſenſe, and 'as often to cloſe the ſenſe during the running of a line; though a cloſe in the melody during the movement of the thought, or a cloſe in the thought during the movement of the melody, cannot be agreeable.

The accent, to which we proceed, is not leſs eſſential than the other circumſtances above handled. By a good ear it will be diſcerned, that in every line there is one ſyllable diſtinguiſhable from the reſt by a capital accent: that ſyllable, being the ſeventh portion, is invariably long.

Nec bene promeritis || capitûr nec | tangitur ira

Again:

Non ſibi ſed toto || genitûm ſe | credere mundo

Again:

Qualis ſpelunca || ſubitò com | mota columba

In theſe examples, the accent is laid upon the laſt ſyllable of a word; which is favourable to the melody in the following reſpect, that the pause, which for the ſake of reading diſtinctly muſt follow every word, gives opportunity to prolong the accent. And for that reaſon, a line thus accented, has a more ſpirited air, than when the accent is placed on any other ſyllable. Compare the foregoing lines with the following.

Alba neque Affyrio || fucâtur | Iana veneno

Again:

Panditur interea || domus omnipo | tentis Olympi

Again:

Verifica-
tion.

Verifica-
tion.

Again :

Olli sedato || respōdit | corde Latinus.

In lines where the pause comes after the short syllable succeeding the fifth portion, the accent is displaced, and rendered less sensible : it seems to be split into two, and to be laid partly on the fifth portion, and partly on the seventh its usual place ; as in

Nuda genu, nodōque || sinūs ool | lecta fluentes.

Again :

Formosam resonāre || docēs Amar | yllida sylvas.

Beside this capital accent, slighter accents are laid upon other portions ; particularly upon the fourth, unless where it consists of two short syllables ; upon the ninth, which is always a long syllable ; and upon the eleventh, where the line concludes with a monosyllable. Such conclusion, by the by, impairs the melody, and for that reason is not to be indulged unless where it is expressive of the sense. The following lines are marked with all the accents.

Ludere quæ velleſſem calamō permittit agreſſi

Again :

Et duræ quercus sudābunt rôſcida mella

Again :

Perturiunt mōntes, naſcētur ridiculūs mus.

Reflecting upon the melody of hexameter verse, we find, that order or arrangement doth not constitute the whole of it : for when we compare different lines, equally regular as to the succession of long and short syllables, the melody is found in very different degrees of perfection ; which is not occasioned by any particular combination of dactyles and spondees, or of long and short syllables, because we find lines where dactyles prevail, and lines where spondees prevail, equally melodious. Of the former take the following instance :

Æneadum genitrix hominum divumque voluptas.

Of the latter :

Molli paulatim flaveſcet campus ariſta.

What can be more different as to melody than the two following lines, which, however, as to the succession of long and short syllables, are constructed precisely in the same manner.

Spond. Dact. Spond. Spond. Dact. Spond. Dact.
Ad talos ſtola dimiſſa et circumdata palla. Hor.
Spond. Dact. Spond. Spond. Dact. Spond. Dact.
Placatumque nitet diſſuſo lumine cœlum. Lucret.

In the former, the pause falls in the middle of a word, which is a great blemish, and the accent is disturbed by a harsh elision of the vowel *a* upon the particle *et*. In the latter, the pauses and the accent are all of them distinct and full : there is no elision : and the words are more liquid and sounding. In these particulars consists the beauty of an hexameter line with respect to melody ; and by neglecting these, many lines in the satires and epistles of Horace are less agreeable than plain prose ; for they are neither the one nor the other in perfection. To draw melody from these lines, they must be pronounced without relation to the sense : it must not be regarded, that words are divided by pauses, nor that harsh elisions are multiplied. To add

to the account, prosaic low sounding words are introduced ; and, which is still worse, accents are laid on them. Of such faulty lines take the following instances.

Candida rectaque ſit, munda hæcenus ſit neque longa.

Jupiter exclamat ſimul atque audiri ; at in ſe

Cuſtodēs, leſtica, ciniflones, paraſitæ

Optimus eſt modulatur, ut Alſenus Vaſer omni

Nunc illud tantum quæram, meritorie tibi ſit.

II. Next in order comes English heroic verse ; which shall be examined under the whole five heads, of number, quantity, arrangement, pause, and accent. This verse is of two kinds ; one named *rhyme* or *metre*, and one *blank verse*. In the former, the lines are connected two and two by similarity of sound in the final syllables ; and two lines so connected are termed a *couplet* : similarity of sound being avoided in the latter, couplets are banished. These two sorts must be handled separately, because there are many peculiarities in each.

(1.) Beginning with rhyme or metre, the first article shall be discussed in a few words. Every line consists of ten syllables, five short and five long ; from which there are but two exceptions, both of them rare. The first is, where each line of a couplet is made eleven syllables, by an additional short syllable at the end :

There heroes' wits are kept in pond'rous vases,
And beaus' in snuff-boxes and tweezer-cases.
The piece, you think, is incorrect : Why, take it,
I'm all submission ; what you'd have it, make it.

This licence is sufferable in a single couplet ; but if frequent, would give disgust.

The other exception concerns the second line of a couplet, which is sometimes stretched out to 12 syllables, termed an *Alexandrine line* :

A needless Alexandrine ends the song, [along,
That, like a wounded snake, drags its flow length

It doth extremely well when employed to close a period with a certain pomp and solemnity, where the subject makes that tone proper.

With regard to quantity, it is unnecessary to mention a second time, that the quantities employed in verse are but two, the one double of the other ; that every syllable is reducible to one or other of these standards ; and that a syllable of the larger quantity is termed *long*, and of the lesser quantity *short*. It belongs more to the present article, to examine what peculiarities there may be in the English language as to long and short syllables. Every language has syllables that may be pronounced long or short at pleasure ; but the English above all abounds in syllables of that kind. In words of three or more syllables, the quantity for the most part is invariable : the exceptions are more frequent in dissyllables : but as to monosyllables, they may, without many exceptions, be pronounced either long or short ; nor is the ear hurt by a liberty that is rendered familiar by custom. This shows, that the melody of English verse must depend less upon quantity than upon other circumstances : in which it differs widely from Latin verse, where every syllable, having but

Verifica-
tion.

but one sound, strikes the ear uniformly with its accustomed impression; and a reader must be delighted to find a number of such syllables, disposed so artfully as to be highly melodious. Syllables variable in quantity cannot possess this power: for though custom may render familiar both a long and a short pronunciation of the same word; yet the mind, wavering between the two sounds, cannot be so much affected as where every syllable has one fixed sound.

[103], 116. And with respect to arrangement, which may be brought within a narrow compass, the English heroic line is commonly iambic, the first syllable short, the second long, and so on alternately thro' the whole line. One exception there is, pretty frequent, of lines commencing with a trocheus, i. e. a long and a short syllable: but this affects not the order of the following syllables, which go on alternately as usual, one short and one long. The following couplet affords an example of each kind.

Some in the fields of purēt æther plāy,
And bānk and whiten in the blaze of dāy.

117. It is a great imperfection in English verse, that it excludes the bulk of polysyllables, which are the most sounding words in our language; for very few of them have such alternation of long and short syllables as to correspond to either of the arrangements mentioned. English verse accordingly is almost totally reduced to dissyllables and monosyllables: *magnanimity* is a sounding word totally excluded: *impetuosity* is still a finer word, by the resemblance of the sound and sense; and yet a negative is put upon it, as well as upon numberless words of the same kind. Polysyllables composed of syllables long and short alternately, make a good figure in verse; for example, *observance, opponent, offensive, pindaric, productive, prolific*, and such others of three syllables. *Imitation, imperfection, misdemeanor, mitigation, moderation, observator, ornamental, regulator*, and others similar of four syllables, beginning with two short syllables, the third long, and the fourth short, may find a place in a line commencing with a trocheus.

One would not imagine, without trial, how uncouth false quantity appears in verse; not less than a provincial tone or idiom. The article *the* is one of the few monosyllables that is invariably short: observe how harsh it makes a line where it must be pronounced long:

This nŷmph, to the dēstruŷtion of mānkīnd.
Again,
Th' advēnt'rōus bārōn thē brīght lōcks ādmīr'd.

Let it be pronounced short, and it reduces the melody almost to nothing: better so, however, than false quantity. In the following examples we perceive the same defect.

And old impertinence || expel by new
With varying vanities || from ev'ry part
Love in these labyrinths || his slaves detains
New stratagems || the radiant lock to gain

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Her eyes half languishing || half drown'd in tears
Roar'd for the handkerchief || that caus'd his pain
Passions like elements || though born to fight.

118. The great variety of melody conspicuous in English verse, arises chiefly from the pauses and accents; which are of greater importance than is commonly thought. The pause, which paves the way to the accent, offers itself first to our examination; and from a very short trial, the following facts will be verified. 1st, A line admits but one capital pause. 2d, In different lines, we find this pause after the fourth syllable, after the fifth, after the sixth, and after the seventh. These four places of the pause lay a solid foundation for dividing English heroic lines into four kinds; and unless the reader attend to this distinction, he cannot have any just notion of the richness and variety of English versification. Each kind or order hath a melody peculiar to itself, readily distinguishable by a good ear; the cause of which will be afterwards made evident. It must be observed, at the same time, that the pause cannot be made indifferently at any of the places mentioned: it is the sense that regulates the pause, as will be seen afterward; and consequently, it is the sense that determines of what order every line must be: there can be but one capital musical pause in a line; and that pause ought to coincide, if possible, with a pause in the sense, in order that the found may accord with the sense.

What is said shall be illustrated by examples of each fort or order. And first of the pause after the fourth syllable:

Back thro' the paths || of pleasing sense I ran
Again,
Profuse of bliss || and pregnant with delight
After the fifth;

So when an angel || by divine command,
With rising tempests || shakes a guilty land.

After the sixth:

Speed the soft intercourse || from soul to soul
Again,
Then from his closing eyes || thy form shall part

After the seventh:

And taught the doubtful battle || where to rage
Again,
And in the smooth description || murmur still

119. Beside the capital pause now mentioned, inferior pauses will be discovered by a nice ear. Of these there are commonly two in each line: one before the capital pause, and one after it. The former comes invariably after the first long syllable, whether the line begin with a long syllable or a short. The other in its variety imitates the capital pause: in some lines it comes after the sixth syllable, in some after the seventh, and in some after the eighth. Of these semipauses take the following examples.

1st and 8th:

Led | through a sad || variety | of wo.

1st and 7th :

Still | on that breast || enamour'd | let me lie

2d and 8th :

From storms | a shelter || and from heat | a shade

2d and 6th :

Let wealth | let honour || wait | the wedded dame

2d and 7th :

Above | all pain || all passion | and all pride

Even from these few examples it appears, that the place of the last semipause, like that of the full pause, is directed in a good measure by the sense. Its proper place with respect to the melody is after the eighth syllable, so as to finish the line with an iambus distinctly pronounced, which, by a long syllable after a short, is a preparation for rest : but sometimes it comes after the sixth, and sometimes after the seventh syllable, in order to avoid a pause in the middle of a word, or between two words intimately connected; and so far melody is justly sacrificed to sense.

120. In discoursing of hexameter verse, it was laid down as a rule, That a full pause ought never to divide a word : such licence deviates too far from the coincidence that ought to be between the pauses of sense and of melody. The same rule must obtain in an English line; and we shall support reason by experiments :

A noble superfluity it craves

Abhor, a perpe|uity should stand

These lines seem scarcely distinguishable from prose. The same rule is not applicable to a semipause, which, being short and faint, is not sensibly disagreeable when it divides a word.

Relent | less walls || whose darksome round | contains

For her | white virgins || hymn | neals sing

In these | deep solitudes || and aw | ful cells

It must however be acknowledged, that the melody here suffers in some degree : a word ought to be pronounced without any rest between its component syllables : a semipause that bends to this rule, is scarce perceived.

121. The capital pause is so essential to the melody, that one cannot be too nice in the choice of its place, in order to have it clear and distinct. It cannot be in better company than with a pause in the sense; and if the sense require but a comma after the fourth, fifth, sixth, or seventh syllable, it is sufficient for the musical pause. But to make such coincidence essential, would cramp versification too much; and we have experience for our authority, that there may be a pause in the melody where the sense requires none. We must not however imagine, that a musical pause may come after any word indifferently : some words, like syllables of the same word, are so intimately connected, as not to bear a separation even by a pause : the separating, for example, a substantive from its article would be harsh and unpleasant; witness the following line, which cannot be pronounced with a pause as marked,

If Delia smile, the || flow'rs begin to spring.

But ought to be pronounced in the following manner,

If Delia smile, || the flow'rs begin to spring.

If then it be not a matter of indifference where to make the pause, there ought to be rules for determining what words may be separated by a pause, and what are incapable of such separation. We shall endeavour to ascertain these rules; not chiefly for their utility, but in order to unfold some latent principles, that tend to regulate our taste even where we are scarce sensible of them : and to that end, the method that appears the most promising, is to run over the verbal relations, beginning with the most intimate. The first that presents itself, is that of adjective and substantive, being the relation of subject and quality, the most intimate of all : and with respect to such intimate companions, the question is, Whether they can bear to be separated by a pause. What occurs is, that a quality cannot exist independent of a subject; nor are they separable even in imagination, because they make parts of the same idea : and for that reason, with respect to melody as well as sense, it must be disagreeable to be slow upon the adjective a sort of independent existence, by interjecting a pause between it and its substantive; as in the following examples.

Of thousand bright || inhabitants of air

The sprites of fiery || termagants inflame

The rest, his many-colour'd || robe conceal'd

The same, his ancient || personage to deck

Ev'n here, where frozen || Chastity retires

I sit, with sad || civility, I read

Back to my native || moderation slide

Or shall we ev'ry || decency confound

Time was, a sober || Englishman would knock

And place, on good || security, his gold

Taste, that eternal || wanderer, which flies

But ere the tenth || revolving day was run

First let the just || equivalent be paid

Go, threaten thy earth-born || myrmidons; but here

Haste to the fierce || Achilles' tent (he cries)

All but the ever-wakeful || eyes of Jove

Your own resistless || eloquence employ

122. Considering this matter superficially, one might be apt to imagine, that it must be the same, whether the adjective go first, which is the natural order, or the substantive, which is indulged by the laws of inversion. But we soon discover this to be a mistake : colour, for example, cannot be conceived independent of the surface coloured; but a tree may be conceived, as growing in a certain spot, as of a certain kind, and as spreading its extended branches all around, without ever thinking of its colour. In a word, a subject may be considered with some of its qualities independent of others; though we cannot form an image of any single quality independent of the subject. Thus then, tho' an adjective named first be inseparable from the substantive,

stantive, the proposition does not reciprocate: an image can be formed of the substantive independent of the adjective; and for that reason, they may be separated by a pause, when the substantive takes the lead.

For thee the fates || severely kind ordain
And curs'd with hearts § unknowing how to yield

123. The verb and adverb are precisely in the same condition with the substantive and adjective. An adverb, which modifies the action expressed by the verb, is not separable from the verb even in imagination; and therefore the following lines seem faulty.

And which it much || becomes you to forget
'Tis one thing madly || to disperse my store

But an action may be conceived with some of its modifications, leaving out others, precisely as a subject may be conceived with some of its qualities, leaving out others; and therefore, when by inversion the verb is first introduced, it has no bad effect to interject a pause between it and the adverb that follows: this may be done at the close of a line, where the pause is at least as full as that which divides the line:

While yet he spoke, the Prince advancing drew
Nigh to the lodge, &c.

124. The agent and its action come next, expressed in grammar by the active substantive and its verb. Between these, placed in their natural order, there is no difficulty of interjecting a pause: an active being is not always in motion, and therefore it is easily separable in idea from its action: when in a sentence the substantive takes the lead, we know not that action is to follow; and as rest must precede the commencement of motion, this interval is a proper opportunity for a pause.

Nor when by inversion the verb is placed first, is it lawful to separate it by a pause from the active substantive; because an action is not in idea separable from the agent, more than a quality from the subject to which it belongs.

125. The point of the greatest delicacy regards the active verb and the passive substantive placed in their natural order. On the one hand, it will be observed, that these words signify things which are not separable in idea: killing cannot be conceived without a being that is put to death, nor painting without a surface upon which the colours are spread. On the other hand, an action and the thing on which it is exerted are not, like subject and quality, united in one individual object: the active substantive is perfectly distinct from that which is passive; and they are connected by one circumstance only, that the action exerted by the former is exerted upon the latter. This makes it possible to take the action to pieces, and to consider it first with relation to the agent, and next with relation to the patient. But after all, so intimately connected are the parts of the thought, that it requires an effort to make a separation even for a moment: the substituting to such a degree is not agreeable, especially in works of imagination. The best poets, however, taking advantage of this subtilty, scruple not to sepa-

rate by a pause an active verb from the thing upon which it is exerted. Such pauses in a long work may be indulged; but taken singly, they certainly are not agreeable:

The peer now spreads || the glitt'ring forx wide
As ever fully'd || the fair face of light
Repair'd to search || the gloomy cave of Spleen
Nothing, to make || philosophy thy friend
Shou'd chance to make || the well-drest'd rabble stare
Or cros, to plunder || provinces, the main
These madmen ever hurt || the church or state
How shall we fill || a library with wit
What better teach || a foreigner the tongue
Sure, if I spare || the minister, no rules
Of honour bind me, not to maul his tools.

On the other hand, when the passive substantive is by inversion first named, there is no difficulty of interjecting a pause between it and the verb, more than when the active substantive is first named. The same reason holds in both, that though a verb cannot be separated in idea from the substantive which governs it, and scarcely from the substantive it governs; yet a substantive may always be conceived independent of the verb: when the passive substantive is introduced before the verb, we know not that an action is to be exerted upon it; therefore we may rest till the action commences. For the sake of illustration, take the following examples:

Shrines! where their vigils, pale-ey'd virgins keep
Soon as thy letters; trembling I unclose
No happier task; these faded eyes pursue

What is said about the pause, leads to a general observation, That the natural order of placing the active substantive and its verb, is more friendly to a pause than the inverted order; but that in all the other connections, inversion affords a far better opportunity for a pause. And hence one great advantage of blank verse over rhyme; its privilege of inversion giving it a much greater choice of pauses than can be had in the natural order of arrangement.

126. We now proceed to the slighter connections, which shall be discussed in one general article. Words connected by conjunctions and prepositions admit freely a pause between them, which will be clear from the following instances:

Assume what fexes || and what shape they please
The light militia || of the lower sky

Connecting particles were invented to unite in a period two substantives signifying things occasionally united in the thought, but which have no natural union: and between two things not only separable in idea, but really distinct, the mind, for the sake of melody, cheerfully admits by a pause a momentary disjunction of their occasional union.

127. One capital branch of the subject is still upon hand. It concerns those parts of speech which singly repre-

sent no idea, and which become not significant till they be joined to other words: these are, conjunctions, prepositions, articles, and such like accessories, passing under the name of *particles*. Upon these the question occurs, Whether they can be separated by a pause from the words that make them significant? whether, for example, in the following lines, the separation of the accessory preposition from the principal substantive, be according to rule?

The goddess with || a discontented air
And heighten'd by || the diamond's circling rays
When victims at || yon altar's foot we lay
So take it in || the very words of Crech
An ensign of || the delegates of Jove
Two ages o'er || his native realm he reign'd
While angels, with || their silver wings o'ershade

Or the separation of the conjunction from the word that is connected by it with the antecedent word:

Talthybius and || Eurybates the good

It will be obvious at the first glance, that the foregoing reasoning upon objects naturally connected, is not applicable to words which of themselves are mere ciphers: we must therefore have recourse to some other principle for solving the present question. These particles out of their place are totally insignificant: to give them a meaning, they must be joined to certain words; and the necessity of this junction, together with custom, forms an artificial connection that has a strong influence upon the mind: it cannot bear even a momentary separation, which destroys the sense, and is at the same time contradictory to practice. Another circumstance tends still more to make this separation disagreeable in lines of the first and third order, that it bars the accent; which will be explained afterwards in treating of the accent.

128. Hitherto we have discoursed upon that pause only which divides the line. We proceed to the pause that concludes the line; and the question is, Whether the same rules be applicable to both? This must be answered by making a distinction. In the first line of a couplet, the concluding pause differs little, if at all, from the pause which divides the line; and for that reason, the rules are applicable to both equally. The concluding pause of the couplet is in a different condition: it resembles greatly the concluding pause in an hexameter line: both of them indeed are so remarkable, that they never can be graceful, unless where they accompany a pause in the sense. Hence it follows, that a couplet ought always to be finished with some close in the sense; if not a point, at least a comma. The truth is, that this rule is seldom transgressed: in Pope's works we find very few deviations from the rule: take the following instances:

Nothing is foreign: parts relate to whole;
One all-extending, all-prefering soul
Connects each being —

Another:

To draw fresh colours from the vernal flow'rs;

To steal from rainbows, ere they drop in show'rs,
A brighter walk —

It may be added, with respect to pauses in general, that supposing the connection to be so slender as to admit a pause, it follows not that a pause may in every such case be admitted. There is one rule to which every other ought to bend, That the sense must never be wounded or obscured by the music; and upon that account the following lines seem exceptionable:

Ulysses, first || in public cares, the found,
And,

Who rising, high || th' imperial sceptre rais'd.

With respect to inversion, it appears, both from reason and experiments, that many words which cannot bear a separation in their natural order, admit a pause when inverted. And it may be added, that when two words, or two members of a sentence, in their natural order, can be separated by a pause, such separation can never be amiss in an inverted order. An inverted period, which deviates from the natural train of ideas, requires to be marked in some measure even by pauses in the sense, that the parts may be distinctly known. Take the following examples.

As with cold lips || I kiss'd the sacred veil
With other beauties || charm my partial eyes
Full in my view || set all the bright abode
With words like these || the troops Ulysses rul'd
Back to th' assembly roll || the thronging train
Not for their grief || the Grecian host I blame

The same where the separation is made at the close of the first line of the couplet:

For spirits, freed from mortal laws, with ease,
Assume what sexes and what shapes they please.

The pause is tolerable even at the close of the couplet, for the reason just now suggested, that inverted members require some slight pause in the sense:

'Twas where the plane-tree spreads its shades around;
The altars heav'd; and from the crumbling ground
A mighty dragon shot.

129. Thus a train of reasoning hath insensibly led us to conclusions with regard to the musical pauses, very different from those in the article *Beauty of Language* (sect. II.) concerning the separating by a circumstance words intimately connected. One would conjecture, that where-ever words are separable by interjecting a circumstance, they should be equally separable by interjecting a pause: but, upon a more narrow inspection, the appearance of analogy vanisheth. This will be evident from considering, that a pause in the sense distinguishes the different members of a period from each other; whereas when two words of the same member are separated by a circumstance, all the three make still but one member; and therefore that words may be separated by an interjected circumstance, though these words are not separated by a pause in the sense. This sets the matter in a clear light; for, as observed above, a musical pause is intimately connected with a pause in the sense, and ought, as far as possible, to be governed by it: particularly a musical pause ought never to

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be placed where a pause is excluded by the sense, as, for example, between the adjective and following substantive, which make parts of the same idea; and still less between a particle and the word that makes it significant.

Abstracting at present from the peculiarity of melody arising from the different pauses, it cannot fail to be observed in general, that they introduce into our verse no slight degree of variety. A number of uniform lines having all the same pause, are extremely fatiguing, which is remarkable in the French versification. This imperfection will be discerned by a fine ear even in the shortest succession, and becomes intolerable in a long poem. Pope excels in the variety of his melody, which, if different kinds can be compared, is indeed not less perfect than that of Virgil.

130. From what is last said, there ought to be one exception: Uniformity in the members of a thought, demands equal uniformity in the verbal members which express that thought. When therefore resembling objects or things are expressed in a plurality of verse-lines, these lines in their structure ought to be as uniform as possible, and the pauses in particular ought all of them to have the same place. Take the following examples.

By foreign hands || thy dying eyes were clos'd,
By foreign hands || thy decent limbs compos'd,
By foreign hands || thy humble grave adorn'd.

Again:

Bright as the sun || her eyes the gazers strike;
And, like the sun, || they shine on all alike.

Speaking of Nature, or the God of Nature:

Warms in the sun || refreshes in the breeze,
Glow in the stars || and blossoms in the trees,
Lives through all life || extends through all extent,
Spreads undivided || operates unspent.

131. Pauses will detain us longer than was expected; for the subject is not yet exhausted. It is laid down above, that English heroic verse admits no more but four capital pauses; and that the capital pause of every line is determined by the sense to be after the 4th, the 5th, the 6th, or 7th syllable. That this doctrine holds true so far as melody alone is concerned, will be testified by every good ear. At the same time it is to be admitted, that this rule may be varied where the sense or expression requires a variation, and that so far the melody may justly be sacrificed. Examples accordingly are not infrequent, in Milton especially, of the capital pause being after the 1st, the 2d, or the 3d syllable. And that this licence may be taken, even gracefully, when it adds vigour to the expression, will be clear from the following example. Pope, in his translation of Homer, describes a rock broken off from a mountain, and hurtling to the plain, in the following words:

From sleep to sleep the rolling ruin bounds;
At every shock the crackling wood rebounds;
Still gath'ring force, it smokes; and urg'd amain,
Whirls, leaps, and thunders down, impetuous, to the plain:

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There stops || So Hector. Their whole force he prov'd,
Resistless when he rag'd; and when he stop'd, unmov'd.

In the penult line the proper place of the musical pause is at the end of the 5th syllable; but it enlivens the expression by its coincidence with that of the sense at the end of the 2d syllable: the stopping short before the usual pause in the melody, aids the impression that is made by the description of the stone's stopping short; and what is lost to the melody by this artifice, is more than compensated by the force that is added to the description. Milton makes a happy use of this licence: witness the following examples from his *Paradise Lost*.

—————Thus with the year
Seasons return, but not to me returns
Day || or the sweet approach of even or morn.
Celestial voices to the midnight-air
Sole || or responsive each to others note.
And over them triumphant Death his dart
Shook || but delay'd to strike.

—————And wild uproar
Stood rul'd || stood vast infinitude confin'd.

—————And hard'n'ing in his strength
Glories || for never since created man
Met such embodied force.

From his slack hand the garland wreath'd for Eve
Down dropp'd || and all the faded roses shed.

Of unessential night, receives him next,
Wide gaping || and with utter loss of being,
Threatens him, &c.

—————For now the thought
Both of lost happiness and lasting pain
Torments him || round he throws his baleful eyes, &c.

If we consider the foregoing passages with respect to melody singly, the pauses are undoubtedly out of their proper place; but being united with those of the sense, they enforce the expression, and enliven it greatly; for, as has been more than once observed, the beauty of expression is communicated to the sound, which, by a natural deception, makes even the melody appear more perfect than if the musical pauses were regular.

132. To explain the rules of accenting, two general observations must be premised. The first is, That accents have a double effect: they contribute to the melody, by giving it air and spirit: they contribute no less to the sense, by distinguishing important words from others. These two effects can never be separated, without impairing the concord that ought to subsist between the thought and the melody: an accent, for example, placed on a low word, has the effect to burlesque it, by giving it an unnatural elevation; and the injury thus done to the sense does not rest there, for it seems also to injure the melody. Let us only reflect what a ridiculous figure a particle must make with an accent or emphasis put upon it, a particle that of itself has no meaning, and that serves only, like cement, to unite words significant. The other general observation is, That a word of whatever number of syllables, is not accented upon more than one of them.

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them. The reason is, that the object is set in its best light by a single accent, so as to make more than one unnecessary for the sense: and if another be added, it must be for the sound merely; which would be a transgression of the foregoing rule, by separating a musical accent from that which is requisite for the sense.

133. Keeping in view the foregoing observations, the doctrine of accenting English heroic verse is extremely simple. In the first place, accenting is confined to the long syllables; for a short syllable is not capable of an accent. In the next place, as the melody is enriched in proportion to the number of accents, every word that has a long syllable may be accented; unless the sense interpose, which rejects the accenting a word that makes no figure by its signification. According to this rule, a line may admit five accents; a case by no means rare.

134. But supposing every long syllable to be accented, there is, in every line, one accent that makes a greater figure than the rest, being that which precedes the capital pause. It is distinguished into two kinds; one that is immediately before the pause, and one that is divided from the pause by a short syllable. The former belongs to lines of the first and third order: the latter to those of the second and fourth. Examples of the first kind:

Smooth flow the waves || the zephyrs gently play,
Belinda smil'd || and all the world was gay.

He rais'd his azure wand || and thus began.

Examples of the other kind:

There lays three garters || half a pair of gloves,
And all the trophies || of his former loves.

Our humble province || is to tend the fair,
Not a less pleasing || though less glorious care.

And hew triumphal arches || to the ground.

135. It is a capital defect in the composition of verse, to put a low word, incapable of an accent, in the place where this accent should be: this bars the accent altogether; than which there seems no fault more subversive of the melody, if it be not the barring a pause altogether. Neither does any single circumstance contribute more to the energy of verse, than to put an important word where the accent should be, a word that merits a peculiar emphasis. To show the bad effect of excluding the capital accent, the reader is referred to some instances given above, where particles are separated by a pause from the capital words that make them significant; and which particles ought, for the sake of melody, to be accented, were they capable of an accent. Add to these the following instances from the Essay on Criticism.

Of leaving what || is natural and fit

Not yet purg'd off, || of spleen and four disdain *line 448.*

l. 528.

No pardon vile || obscenity should find

l. 531.

When love was all || an easy monarch's care

For 'tis but half || a judge's task, to know: *l. 537.*

'Tis not enough, || taste, judgment, learnings, join *l. 562*

That only makes || superior sense below'd *l. 563.*

Whose right it is, || uncancel'd, to be dull *l. 578.*

'Tis best sometimes || your censure to restrain *l. 590.*

l. 597.

When this fault is at the end of a line that closes a couplet, it leaves not the least trace of melody:

But of this frame the bearings, and the ties,
The strong connections, nice dependencies.

In a line expressive of what is humble or dejected, it improves the resemblance between the sound and sense to exclude the capital accent. This, to our taste, is a beauty in the following lines.

In these deep solitudes || and awful cells

The poor inhabitant || beholds in vain

136. To conclude this article, the accents are not, like the syllables, confined to a certain number: some lines have no fewer than five, and there are lines that admit not above one. This variety, as we have seen, depends entirely on the different powers of the component words: particles, even where they are long by position, cannot be accented; and polysyllables, whatever space they occupy, admit but one accent. Polysyllables have another defect, that they generally exclude the full pause. It is shown above, that few polysyllables can find place in the construction of English verse; and here are reasons for excluding them, could they find place.

137. It was mentioned above †, that the four sorts of † No 118. lines which enter into English heroic verse, have, each of them, a peculiar melody distinguishable by a good ear. This it is now proposed to account for. But first, it is proper to warn the candid reader not to expect this peculiarity of modulation in every instance: for the thought and expression have so great an influence, as often to make the poorest melody pass for rich and spirited. It is necessary therefore, first, That the experiment be tried upon lines equal with respect to the thought and expression; for otherwise one may easily be misled in judging of the melody: and next, That these lines be regularly accented before the pause; for upon a matter abundantly refined in itself, it is wisest not to be embarrassed with faulty and irregular lines.

These preliminaries adjusted, we begin with some general observations, that will save repeating the same thing over and over upon each particular case. And, first, an accent succeeded by a pause, as in lines of the first and third order, makes a much greater figure than where the voice goes on without a stop. The fact is so certain, that no person who has an ear can be at a loss to distinguish that accent from others. Nor have we far to seek for the efficient cause: the elevation of an accepting tone produceth in the mind a similar elevation,

vation, which continues during the pause (A) : but where the pause is separated from the accent by a short syllable, as in lines of the second and fourth order, the impression made by the accent is more slight when there is no stop, and the elevation of the accent is gone in a moment by the falling of the voice in pronouncing the short syllable that follows. The pause also is sensibly affected by the position of the accent : in lines of the first and third order, the close conjunction of the accent and pause occasions a sudden stop without preparation, which rouses the mind, and bestows on the melody a spirited air : when, on the other hand, the pause is separated from the accent by a short syllable, which always happens in lines of the second and fourth order, the pause is soft and gentle : for this short unaccented syllable succeeding one that is accented, must of course be pronounced with a falling voice, which naturally prepares for a pause ; and the mind falls gently from the accented syllable, and slides into rest as it were insensibly. Further, the lines themselves derive different powers from the position of the pause, which will thus appear. A pause after the fourth syllable divides the line into two unequal portions, of which the larger comes last : this circumstance resolving the line into an ascending series, makes an impression in pronouncing like that of ascending ; and to this impression contributes the redoubled effort in pronouncing the larger portion, which is last in order. The mind has a different feeling when the pause succeeds the fifth syllable, which divides the line into two equal parts : these parts, pronounced with equal effort, are agreeable by their uniformity. A line divided by a pause after the sixth syllable, makes an impression opposite to that first mentioned : being divided into two unequal portions, of which the shorter is last in order, it appears like a slow descending series ; and the second portion being pronounced with less effort than the first, the diminished effort prepares the mind for rest. And this preparation for rest is still more sensibly felt where the pause is after the seventh syllable, as in lines of the fourth order.

138. To apply these observations is an easy task. A line of the first order is of all the most spirited and lively : the accent, being followed instantly by a pause, makes an illustrious figure : the elevated tone of the accent elevates the mind : the mind is supported in its elevation by the sudden unprepared pause which rouses and animates : and the line itself, representing by its unequal division an ascending series, carries the mind still higher, making an impression similar to that of going upward. The second order has a modulation sensibly sweet, soft, and flowing : the accent is not so sprightly as in the former, because a short syllable intervenes between it and the pause ; its elevation, by the same means, vanisheth instantaneously ; the mind, by a falling voice, is gently prepared for a stop : and the pleasure of uniformity from the division of the line into two equal parts, is calm and sweet. The third order has a

modulation not so easily expressed in words : it in part resembles the first order, by the liveliness of an accent succeeded instantly by a full pause : but then the elevation occasioned by this circumstance, is balanced in some degree by the remitted effort in pronouncing the second portion, which remitted effort has a tendency to rest. Another circumstance distinguisheth it remarkably : its capital accent comes late, being placed on the sixth syllable, and this circumstance bestows on it an air of gravity and solemnity. The last order resembles the second in the mildness of its accent, and softness of its pause ; it is still more solemn than the third, by the lateness of its capital accent : it also possesses in a higher degree than the third, the tendency to rest ; and by that circumstance is of all the best qualified for closing a period in the completest manner.

139. But these are not all the distinguishing characters of the different orders. Each order also is distinguished by its final accent and pause : the unequal division in the first order, makes an impression of ascending ; and the mind at the close is in the highest elevation, which naturally prompts it to put a strong emphasis upon the concluding syllable, whether by raising the voice to a sharper tone, or by expressing the word in a fuller tone. This order accordingly is of all the least proper for concluding a period, where a cadence is proper, and not an accent. The second order, being destitute of the impression of ascent, cannot rival the first order in the elevation of its concluding accent, nor consequently in the dignity of its concluding pause ; for these have a mutual influence. This order, however, with respect to its close, maintains a superiority over the third and fourth orders : in these the close is more humble, being brought down by the impression of descent, and by the remitted effort in pronouncing ; considerably in the third order, and still more considerably in the last. According to this description, the concluding accents and pauses of the four orders being reduced to a scale, will form a descending series probably in an arithmetical progression.

140. After what is said, it will scarce be thought refining too much to suggest, that the different orders are qualified for different purposes, and that a poet of genius will be naturally led to make a choice accordingly. The first order seems proper for a sentiment that is bold, lively, or impetuous ; the third order, for what is grave, solemn, or lofty ; the second, for what is tender, delicate, or melancholy, and in general for all the sympathetic emotions ; and the last for subjects of the same kind, when tempered with any degree of solemnity. It is not contended that any one order is fitted for no other talk than that assigned it ; for at that rate, no sort of melody would be left for accompanying thoughts that have nothing peculiar in them. It is meant to suggest, that each of the orders is peculiarly adapted to certain subjects, and better qualified than the others for expressing them. The best way to judge

is.

(A) Hence the liveliness of the French language as to sound, above the English ; the last syllable in the former being generally long and accented, the long syllable in the latter being generally as far back in the word as possible, and often without an accent. For this difference there appears no cause so probable as temperament and disposition ; the French being brisk and lively, the English sedate and reserved : and this, if it hold, is a pregnant instance of a resemblance between the character of a people and that of their language.

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tion.

is by experiment; and to avoid the imputation of a partial search, the influences shall be confined to a single poem, beginning with the first order.

On her white breast a sparkling cross she wore,
Which Jews might kiss, and infidels adore.
Her lively looks a sprightly mind disclose,
Quick as her eyes, and as unfix'd as those:
Favours to none, to all the smiles extends;
Of the rejects, but never once offends.
Bright as the sun, her eyes the gazers strike;
And, like the sun, they shine on all alike.
Yet graceful ease, and sweetness void of pride,
Might hide her faults, if belles had faults to hide;
If to her share some female errors fall,
Look on her face, and you'll forget 'em all.

Rape of the Lock.

In accounting for the remarkable liveliness of this passage, it will be acknowledged by every one who has an ear, that the melody must come in for a share. The lines, all of them, are of the first order; a very unusual circumstance in the author of this poem, so eminent for variety in his versification. Who can doubt, that he has been led by delicacy of taste to employ the first order preferably to the others?

Second order.

Our humble province is to tend the fair,
Not a less pleasing, though less glorious care;
To save the powder from too rude a gale,
Nor let th' imprison'd essences exhale;
To draw fresh colours from the vernal show'rs;
To steal from rainbows, ere they drop their show'rs,
&c.

Again:

Oh, thoughtless mortals! ever blind to fate,
Too soon dejected, and too soon elate.
Sudden, these honours shall be snatch'd away,
And curs'd for ever this victorious day.

Third order.

To fifty chosen sylphs, of special note,
We trust th' important charge, the petticoat.

Again:

Oh say what stranger cause, yet unexplor'd,
Could make a gentle belle reject a lord?

A plurality of lines of the fourth order, would not have a good effect in succession; because, by a remarkable tendency to rest, their proper office is to close a period. The reader, therefore, must be satisfied with instances where this order is mixed with others.

Not louder shrieks to pitying heav'n are cast,
When husbands, or when lapdogs, breathe their last.

Again:

Steel could the works of mortal pride confound,
And hew triumphal arches to the ground.

Again:

She fees, and trembles at th' approaching ill,
Just in the jaws of ruin, and codille.

Again:

With earnest eyes, and round unthinking face,
He first the snuff-box open'd, then the case.

And this suggests another experiment, which is, to set the different orders more directly in opposition, by

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tion.

giving examples where they are mixed in the same passage.

First and second orders.

Sol through white curtains shot a tim'rous ray,
And op'd those eyes that must eclipse the day.

Again:

Not youthful kings in battle seiz'd alive,
Not scornful virgins who their charms survive,
Not ardent lovers robb'd of all their bliss,
Not ancient ladies when refus'd a kiss,
Not tyrants fierce that unrepenting die,
Not Cynthia when her mantua's pin'd awry,
E'er felt such rage, repentment, and despair,
As thou, sad virgin! for thy ravish'd hair.

First and third.

Think what an equipage thou hast in air.
And view with scorn two pages and a chair.

Again:

What guards the purity of melting maids,
In courtly balls, and midnight masquerades,
Safe from the treach'rous friend, the daring spark,
The glance by day, the whisper in the dark?

Again:

With tender billet-doux he lights the pyre,
And breathes three am'rous sighs to raise the fire;
Then prostrate falls, and begs, with ardent eyes,
Soon to obtain, and long possess the prize.

Again:

Jove's thunder roars, heav'n trembles all around,
Blue Neptune storms, the bellowing deeps resound,
Earth shakes her nodding tow'rs, the ground gives way,
And the pale ghosts start at the flash of day!

Second and third.

Suuk in Thalestris' arms, the nymph he found,
Her eyes dejected, and her hair unbound.

Again:

On her heav'd bosom hung her drooping head,
Which with a sigh she rais'd; and thus she said.

141. Upon the whole, from what has been observed, we may with assurance pronounce, that great is the merit of English heroic verse: for though uniformity prevails in the arrangement, in the equality of the lines, and in the resemblance of the final sounds; variety is still more conspicuous in the pauses and in the accents, which are diversified in a surprising manner. Of the beauty that results from a due mixture of uniformity and variety *, many instances have already * See the article UNIFORMITY and Variety. occurred, but none more illustrious than English versification: however rude it may be in the simplicity of its arrangement, it is highly melodious by its pauses and accents, so as already to rival the most perfect species known in Greece or Rome; and it is no disagreeable prospect to find it susceptible of still greater refinement.

142. (2.) We proceed to blank verse, which hath so many circumstances in common with rhyme, that its peculiarities may be brought within a narrow compass. With respect to form, it differs from rhyme in rejecting the jingle of similar sounds, which purifies it from a childish pleasure. But this improvement is a trifle

trifle compared with what follows. Our verse is extremely cramped by rhyme; and the great advantage of blank verse is, that it is at liberty to attend the imagination in its boldest flights. Rhyme necessarily divides verse into couplets: each couplet makes a complete musical period, the parts of which are divided by pauses, and the whole summed up by a full close at the end: the melody begins anew with the next couplet: and in this manner a composition in rhyme proceeds couplet after couplet. We have frequently had occasion to mention the correspondence and concord that ought to subsist between sound and sense; from which it is a plain inference, that if a couplet be a complete period with regard to melody, it ought regularly to be the same with regard to sense. As it is extremely difficult to support such strictness of composition, licences are indulged, as explained above; which, however, must be used with discretion, so as to preserve some degree of concord between the sense and the music: There ought never to be a full close in the sense but at the end of a couplet; and there ought always to be some pause in the sense at the end of every couplet: the same period as to sense may be extended through several couplets; but each couplet ought to contain a distinct member, distinguished by a pause in the sense as well as in the sound; and the whole ought to be closed with a complete cadence. Rules such as these must confine rhyme within very narrow bounds; a thought of any extent cannot be reduced within its compass; the sense must be curtailed and broken into parts, to make it square with the turnings of the melody; and beside, short periods afford no latitude for inversion.

143. We have examined this point with the greater accuracy, in order to give a just notion of blank verse; and to show, that a slight difference in form may produce a very great difference in substance. Blank verse has the same pauses and accents with rhyme, and a pause at the end of every line, like what concludes the first line of a couplet. In a word, the rules of melody in blank verse, are the same that obtain with respect to the first line of a couplet; but being disengaged from rhyme, or from couplets, there is access to make every line run into another, precisely as to make the first line of a couplet run into the second. There must be a musical pause at the end of every line; but this pause is so slight as not to require a pause in the sense: and accordingly the sense may be carried on with or without pauses, till a period of the utmost extent be completed by a full close both in the sense and the sound: there is no restraint, other than that this full close be at the end of a line; and this restraint is necessary, in order to preserve a coincidence between sense and sound, which ought to be aimed at in general, and is indispensable in the case of a full close, because it has a striking effect. Hence the fitness of blank verse for inversion: and consequently the lustre of its pauses and accents; for which, as observed in the article lately referred to, there is greater scope in inversion, than when words run in their natural order.

144. Nothing contributes more than inversion to the force and elevation of language: the couplets of rhyme
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confine inversion within narrow limits; nor would the elevation of inversion, were there access for it in rhyme, readily accord with the humbler tone of that sort of verse. It is universally agreed, that the loftiness of Milton's style supports admirably the sublimity of his subject; and it is not less certain, that the loftiness of his style arises chiefly from inversion. Shakspeare deals little in inversion; but his blank verse being a sort of measured prose, is perfectly well adapted to the stage, where laboured inversion is highly improper, because in dialogue it never can be natural.

145. Hitherto we have considered that superior power of expression which verse acquires by laying aside rhyme. But this is not the only ground for preferring blank verse: it has another preferable quality not less signal; and that is, a more extensive and more complete melody. Its music is not, like that of rhyme, confined to a single couplet, but takes in a great compass, so as in some measure to rival music properly so called. The interval between its cadences may be long or short at pleasure; and by that means its melody, with respect both to richness and variety, is superior far to that of rhyme, and superior even to that of the Greek and Latin hexameter. Of this observation no person can doubt who is acquainted with the *Paradise Lost*: in which work there are indeed many careless lines; but at every turn the richest melody as well as the sublimest sentiments are conspicuous. Take the following specimen.

Now Morn, her rosy steps in th' eastern clime
Advancing, sow'd the earth with orient pearl;
When Adam wak'd, so custom'd, for his sleep
Was airy light from pure digestion bred,
And temperate vapours bland, which th' only found
Of leaves and fuming rills, Aurora's fan,
Lightly dispers'd, and the shrill matin song
Of birds on ev'ry bough; so much the more
His wonder was to find unwak'd Eve
With tresses compos'd, and glowing cheek,
As through unquiet rest: he on his side
Leaning half-raised, with looks of cordial love
Hung over her enamour'd, and beheld
Beauty, which, whether waking or asleep,
Shot forth peculiar graces; then with voice
Mild, as when Zephyrus on Flora breathes,
Her hand soft touching, whisper'd thus. Awake,
My fairest, my espous'd, my latest found,
Heav'n's last best gift, my ever-new delight,
Awake, the morning shines, and the fresh field
Calls us; we lose the prime, to mark how spring
Our tended plants, how blows the citron grove,
What drops the myrrh, and what the balmy reed,
How nature paints her colours, how the bee
Sits on the bloom extracting liquid sweet.

Book 5, l. 1.

146. Comparing Latin Hexameter with English heroic rhyme, the former has obviously the advantage in the following particulars. It is greatly preferable as to arrangement, by the latitude it admits in placing the long and short syllables. Secondly, the length of an hexameter line hath a majestic air: ours, by its shortness, is indeed more brisk and lively, but much less fitted for the sublime. And, thirdly, the long high-sounding
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foundings words that hexameter admits, add greatly to its majesty. To compensate these advantages, English rhyme possesses a greater number and greater variety both of pauses and of accents. These two sorts of verse stand indeed pretty much in opposition: in hexameter, great variety of arrangement, none in the pauses nor accents: in English rhyme, great variety in the pauses and accents, very little in the arrangement.

147. In blank verse are united, in a good measure, the several properties of Latin hexameter and English rhyme; and it possesses beside many signal properties of its own. It is not confined, like hexameter, by a full close at the end of every line; nor, like rhyme, by a full close at the end of every couplet. Its construction, which admits the lines to run into each other, gives it a still greater majesty than arises from the length of a hexameter line. By the same means, it admits inversion even beyond the Latin or Greek hexameter; for these suffer some confinement by the regular closes at the end of every line. In its music it is illustrious above all: the melody of hexameter verse, is circumscribed to a line; and of English rhyme, to a couplet: the melody of blank verse is under no confinement, but enjoys the utmost privilege of which melody of verse is susceptible; which is, to run hand in hand with the sense. In a word, blank verse is superior to hexameter in many articles; and inferior to it in none, save in the freedom of arrangement, and in the use of long words.

148. In French heroic verse, there are found, on the contrary, all the defects of Latin hexameter and English rhyme, without the beauties of either: subjected to the bondage of rhyme, and to the full close at the end of every couplet, it is also extremely fatiguing by uniformity in its pauses and accents: the line invariably is divided by the pause into two equal parts, and the accent is invariably placed before the pause:

Jeune et vaillant héros // dont la haute sagesse
N'est point la fruit tardif // d'une lente vieillesse.

Here every circumstance contributes to a tiresome uniformity: a constant return of the same pause and of the same accent, as well as an equal division of every line; which fatigue the ear without intermission or change. This matter cannot be set in a better light, than by presenting to the reader a French translation of the following passage of Milton:

• Two of far nobler shape, erect and tall,
Godlike erect, with native honour clad,
In naked majesty, seem'd lords of all:
And worthy seem'd; for in their looks divine
The image of their glorious Maker shone,
Truth, wisdom, sanctitude severe and pure;
Severe, but in true filial freedom plac'd;
Whence true authority in men: though both
Not equal, as their sex not equal seem'd;
For contemplation he and valour form'd;
For softness she and sweet attractive grace;
He for God only, she for God in him.

Were the pauses of the sense and found in this passage but a little better assorted, nothing in verse could be

more melodious. In general, the great defect of Milton's versification, in other respects admirable, is the want of coincidence between the pauses of the sense and found.

The translation is in the following words:

Ce lieux délicieux, ce paradis charmant,
Reçoit deux objets son plus bel ornement;
Leur port majestueux, et leur démarche altière,
Semble leur mériter sur la nature entière,
Ce droit de commander que Dieu leur a donné,
Sur leur auguste front de gloire couronné.
Du Souverain du ciel drille la ressemblance:
Dans leur simples regards éclatante l'innocence,
L'adorable candeur, l'aimable vérité,
La raison, la sagesse, et la sévérité,
Qu'adoucît la prudence, et cet air de droiture
Du visage des rois respectable parure.
Ces deux objets divins n'ont pas les mêmes traits,
Ils paroissent formés, quoique tous deux parfaits;
L'un pour la majesté, la force, et la noblesse;
L'autre pour la douceur, la grace, et la tendresse;
Celui-ci pour Dieu seul, l'autre pour l'homme encor.

Here the sense is fairly translated, the words are of equal power, and yet how inferior the melody!

149. The present article shall be concluded with

A List of the different FEET, and of their NAMES.

1. PYRRHICHIUS, consists of two short syllables. Examples: *Deus, given, cannot, billock, running.*
2. SPONDEUS, consists of two long syllables: *omnes, possess, forewarn, mankind, sometime.*
3. IAMBUS, composed of a short and a long: *pior, intent, degree, appear, consent, repent, demand, report, suspect, affront, event.*
4. TROCHEUS, or CHOREUS, a long and a short: *fervat, whereby, after, legal, measure, burden, boly, lefty.*
5. TRIBRACHYS, three short: *melius, property.*
6. MOLOSSUS, three long: *delectant.*
7. ANAPÆSTUS, two short and a long: *animos, condescend, apprehend, overheard, acquiesce, immature, overcharge, serenade, opportune.*
8. DACTYLUS, a long and two short: *carmina, evident, excellence, estimate, wonderful, altitude, burdened, minister, tenement.*
9. BACCHIUS, a short and two long: *dolores.*
10. HYPOBACCHIUS, or ANTIBACCHIUS, two long and a short: *pelluntur.*
11. CRETICUS, or AMPHIMACER, a short syllable between two long: *insisto, afternoon.*
12. AMPHIBRACHYS, a long syllable between two short: *honore, consider, imprudent, procedure, attended, proposed, respondent, concurrence, apprentice, respectful, revenue.*
13. PROCELUSMATICUS, four short syllables: *bonibus, necessary.*

14. DIS-

14. PŒONDEUS, four long syllables : *infinitus*.
15. DIAMBUS, composed of two iambs : *severitas*.
16. DITROCHÆUS, of two trochæi : *permanere, procurator*.
17. IONICUS, two short syllables and two long : *properabant*.
18. Another foot passes under the same name, composed of two long syllables and two short : *calcarius, possessory*.
19. CHORIAMBUS, two short syllables between two long : *nobilitas*.
20. ANTISPASTUS, two long syllables between two short : *Alexander*.
21. PŒON 1st, one long syllable and three short : *temporibus, ordinary, inventory, temperament*.
22. PŒON 2d, the second syllable long, and the other three short : *rapidity, solemnity, minority, considered, imprudently, extravagant, respectfully, accordingly*.
23. PŒON 3d, the third syllable long and the other three short : *animatus, independent, condescendence, sacerdotal, reimbursement, manufacture*.
24. PŒON 4th, the last syllable long and the other three short : *celeritas*.
25. EPITRITUS 1st, the first syllable short and the other three long : *voluptates*.
26. EPITRITUS 2d, the second syllable short and the other three long : *pœnitentes*.
27. EPITRITUS 3d, the third syllable short and the other three long : *discordias*.
28. EPITRITUS 4th, the last syllable short and the other three long : *fortunatus*.
29. A word of five syllables composed of a pyrrhichius and dactylus : *ministerial*.
30. A word of five syllables composed of a trochæus and dactylus : *singularity*.
31. A word of five syllables composed of a dactylus and trochæus : *precipitation, examination*.
32. A word of five syllables, the second only long : *significancy*.
33. A word of six syllables composed of two dactyles : *impetuosity*.
34. A word of six syllables composed of a tribrachys and dactyle : *pusillanimity*.

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 † Or the 5th page of Sig. M. } 5574 have by mistake been twice numbered in the print-
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N. B. ERRATA, OMISSIONS, &c. noticed and supplied in the APPENDIX at the end of the Work.

